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MILITARY MEDICINE

(*Formerly* THE MILITARY SURGEON)

Official Publication · Association Military Surgeons of the United States

President:
REAR ADM. W. DANA
(MC), U. S. Navy

Editor:
COL. ROBERT E. BITNER
U. S. Army Ret.

Published monthly and constituting two volumes annually.
Volumes commence with the January and July numbers.

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• Entered as second class matter at the post office at Washington, D.C., with additional entry at Menasha, Wisconsin. • Acceptance for mailing at special rate of postage provided for in paragraph 4, section 538 P. L. & R., authorized April 14, 1926. • Publication office: 450 Ahnaip Street, Menasha, Wisconsin. • Editorial and Executive Office: Suite 718, New Medical Building, 1726 Eye St. N.W., Washington, D.C. • Advertising Representative: 280 Madison Ave., New York 16, N.Y. • Subscription $7.50 a year for the United States. Elsewhere throughout the world, $8.50. Current copy, 75 cents. Subscriptions payable in advance. Membership dues (including subscription to MILITARY MEDICINE) $6.00. Checks should be made payable to The Association of Military Surgeons, U.S., and not to any officer personally. • *The addresses of members and subscribers are not changed except upon request.* In every case the old as well as the new address should be given. Requests for change of address must reach the Secretary before the fifteenth of the month to be effective for the following issue. • Requests for reprints should be made at the time of forwarding article. Authors alone are responsible for the opinions expressed in their contributions. Printed in U.S.A.

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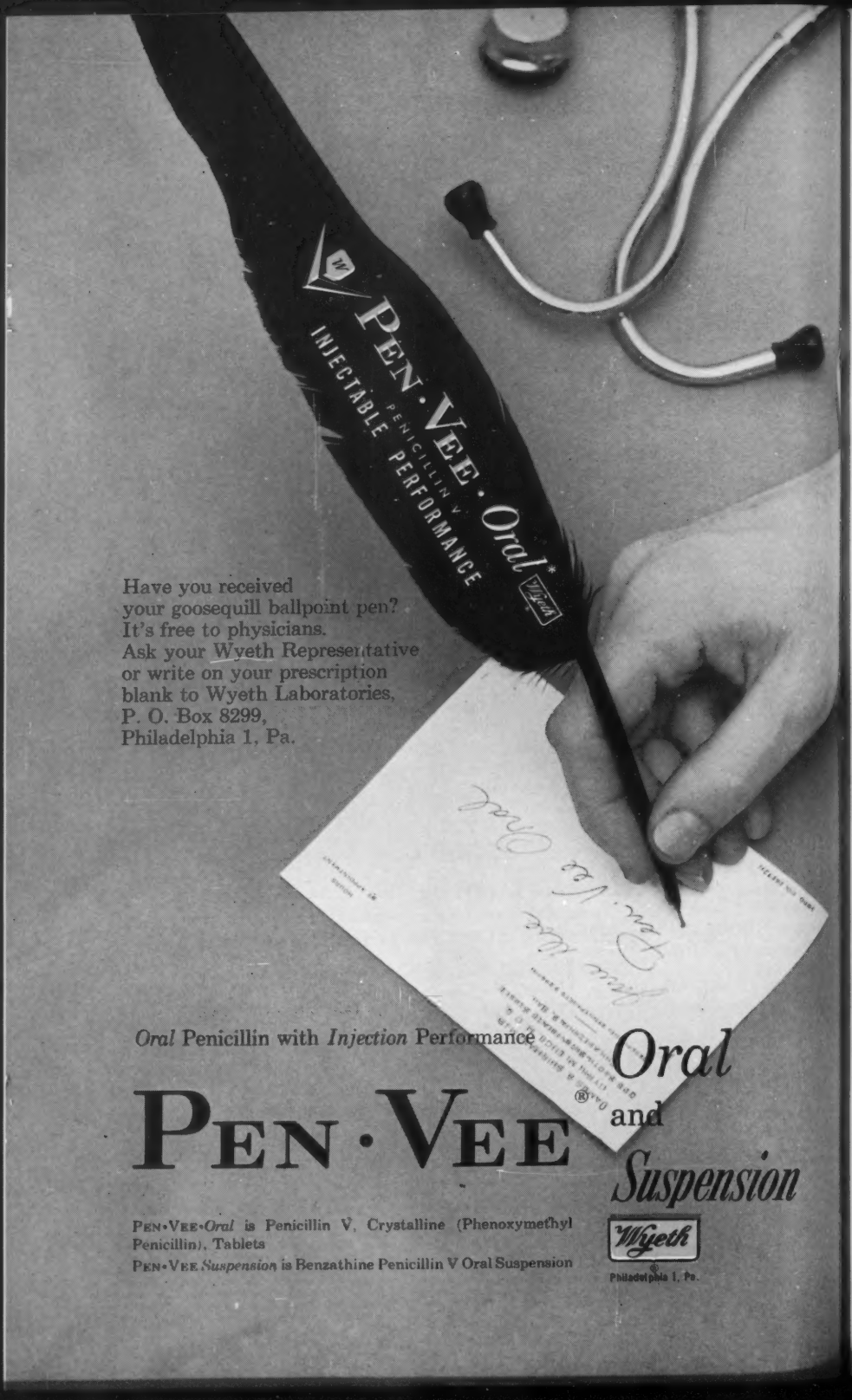

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MILITARY MEDICINE

ORIGINAL ARTICLES

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Acute Ileitis with Ulceration and Perforation Due to Paratyphoid Fever—Report of Eighty-five Cases*

By

LIEUTENANT COLONEL JOSEPH V. CONROY, MC, *U. S. Army*†

(With three illustrations)

THE Salmonella group of organisms has become much less important because of the discovery that a vaccine containing the more common varieties of Salmonella, namely, the typhoid, paratyphoid A, and paratyphoid B, organisms, would give protection. The importance of this discovery can only be analyzed in the light of other nations and peoples who do not receive this protection, and must always be kept in mind for various disaster states which may arise within our own civilian population. Siler and his co-workers in their excellent monograph, "Immunization to Typhoid Fever,"[1] has completely reviewed the development and modification of the typhoid vaccine as used in the Army, and reviewed the incidence of paratyphoid fever in the Army from the turn of the century till 1939. In 1940 Paratyphoid A and B were again incorporated in the typhoid vaccine, and have remained so until the present time, for prior to this period its make-up varied from one Salmonella organism to three. In 1946 several reports appeared in the literature of paratyphoid A infection in military personnel who had been previously immunized with the standard triple vaccine. Syverton[2] reported twenty-one cases of paratyphoid fever in military personnel in the South Pacific, and Tullis[3] recorded two cases in previously immunized military personnel in Sicily. No cases of intestinal perforation as a complication of Paratyphoid Fever has been recorded among military personnel. Our series is composed of only North Korean prisoners of war, and although exposed to these infected patients over a nine month period, no cases of paratyphoid fever appeared among the immunized military personnel in attendance.

A series of spontaneous perforations of the intestinal tract occurred during the Korean conflict among the North Korean prisoners of war. The etiological agent was paratyphoid fever. While treatment consisted of both conservative and operative, this paper will present only those undergoing exploratory laparotomy, and in whom the diagnosis of ileal perforation was confirmed. A total of 203 patients were surgically explored and treated with this diagnosis over a nine month period, but only eighty-five of these patients will be analyzed as the basis of this report. All patients were cared for by the personnel of the combined 3rd and 14th Field Hospitals.

*Honorable Mention in Sir Henry Wellcome Medal and Prize essay competition, 1956.

†Stationed at U. S. Army Hospital, Fort Dix, N.J.

Classification

Salmonella infection is generally considered a septicemia, and the symptoms correspond to the organism involved in the majority of cases.[4]

Group A organisms cause essentially a septic course with chills, fever, headache, sweating, nausea and vomiting without diarrhea.

Group B organisms cause frequently a short febrile course, but mainly enteric disturbances with cramping and diarrhea.

Group C organisms give a more septicopyemic infection.

While the above classification is true in a broad sense, a sub-classification of Group A organisms was necessary upon reviewing our cases, for while all patients developed perforation of the intestinal tract, the prodromal symptoms were varied. On this basis the eighty-five patients were so classified:

1. Systemic or septicemic
2. Enteric
   a. Acute
   b. Sub-acute

1. Systemic or Septicemic

Nine patients were classified as Systemic, with an average duration of symptoms of ten days prior to the development of sudden severe abdominal pain, i.e., intestinal perforation and peritonitis. Prodromal symptoms were chills, fever, anorexia, nausea, and headache. Gastroenteric symptoms were either completely absent or of a minor consequence, with only one patient having had diarrhea, and only three patients having complained of constipation. The initial symptoms of each were such that no patient presented himself for treatment until the onset of sudden abdominal pain, which, after it had developed, was severe and constant.

2. Enteric

a. Acute. Forty-five (45) patients were classified as Acute Enteric. All were Koreans, with the exception of one, who was Chinese. The initial symptom in each was sudden severe abdominal pain, i.e., intestinal perforation and peritonitis. Following the sudden onset of abdominal pain, most patients complained of anorexia, diarrhea, vomiting, nausea, fever, chills, constipation, dysuria, frequency, oliguria, and headache, in that order of frequency of occurrence.

b. Sub-acute. Thirty-one (31) patients were classified as Sub-acute Enteric. The average duration of symptoms prior to the onset of sudden severe abdominal pain, i.e., intestinal perforation and peritonitis, was eleven days. A breakdown of the initial symptoms, in order of frequency, is as follows: abdominal cramps, anorexia, diarrhea, weakness, fever, nausea, vomiting, chills, headache, dysuria, constipation, and in one patient, bloody stools. The predominant and most frequent prodromal symptom was colicky abdominal pain.

Incidence

While this paper will present and analyze eighty-five patients, there were 203 patients who were found to have perforation of the ileum and peritonitis on surgical exploration. The period of time involved was nine months, extending from October 1950 to June 1951. The prisoner of war population during this period was approximately 75,000 to 100,000.

The graph (Table 1) shows only those patients in whom the diagnosis was proven at surgery. The highest incidence was noted during the winter months, and was probably a seasonal inclination of the Paratyphoid Fever infection.

Age and Sex

Although the prisoner population was both male and female, all those infected were males. In this series of eighty-five cases, the average age was twenty-two, with a range from seventeen to sixty-one years.

Clinical Evaluation

The majority of the patients upon admission to the hospital were in a state of shock. The average temperature and pulse

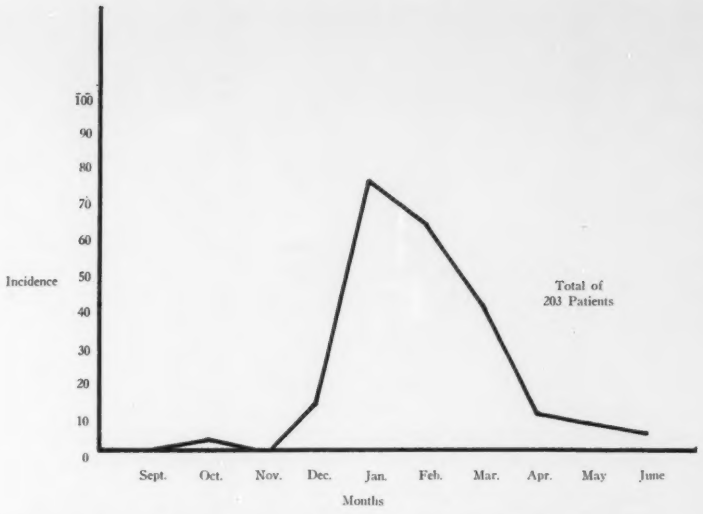

TABLE 1. INCIDENCE OF SPONTANEOUS PERFORATION OF THE ILEUM FROM SEPTEMBER 1950 TO JUNE 1951

recordings were as shown in table 2. Dehydration was most marked in those having watery stools. All patients showed signs of generalized peritonitis with rigidity, tenderness and rebound tenderness of the entire abdomen.

In an attempt to clarify the diagnosis the initial location of the sudden severe abdominal pain was elicited. Fifty-five patients described the initial sudden severe pain of perforation as either generalized or lower abdominal, but it is interesting to note that eleven patients localized the sudden pain in their right lower abdominal quadrant, and seven patients in the epigastric region (Table 3).

TABLE 2. PREOPERATIVE AVERAGE TEMPERATURE AND PULSE

Classification	Temperature	Pulse
Systemic	98.8°F	105
Enteric:		
Acute	99.7°F	95
Subacute	100.5°F	?

LABORATORY FINDINGS

The average WBC's revealed a mild leucocytosis with the absence of an expected eosinophilia (Table 4).

Routine preoperative roentgenological examination of the chest and abdomen was performed in the majority of the cases. Active pulmonary tuberculosis was reported in three patients, and findings of pneumonia in five patients. Roentgenograms of the abdomen were taken in most cases, with an upright view wherever possible. "Dilated loops of small bowel and multiple fluid levels" were

TABLE 3. INITIAL LOCATION OF THE SUDDEN ABDOMINAL PAIN (PERFORATION)

Location	Systemic	Acute Enteric	Subacute Enteric
Generalized	0	12	18
Lower abdominal	3	12	10
Right lower abdominal quadrant	4	7	1
Epigastric	2	4	1
Parumbilical	0	2	0
Left lower abdominal quadrant	0	2	0
No mention	0	7	1

TABLE 4. PREOPERATIVE AVERAGE WHITE BLOOD CELL COUNT

Classification	No. of Patients Having W.B.C.'s	W.B.C.	Neutro.	Lympho.	Mono.	Eosin.
Systemic	4	13,475	77	23	0	0
Enteric:						
Acute	11	11,440	80	17	2	1
Subacute	14	14,090	74	22	4	0

reported as seen on most of the flat films of the abdomen. On the upright film a high incidence of free intraperitoneal subdiaphragmatic air was noted (Table 5).

TREATMENT

All eighty-five patients were surgically explored with the preoperative diagnosis of intestinal perforation and generalized peritonitis. Preparation for surgery consisted of parenteral fluids, antibiotics and intestinal decompression. While neither elaborate equipment nor personnel were available for extensive blood volume and electrolytic determination, glucose in water and in saline combined with whole type O blood were used in replacing the depleted body fluids. The antibiotics used in all cases, both pre- and postoperative, were penicillin and streptomycin. The short intestinal Levin tube and the Wagensteen suction apparatus were used for intestinal decompression both pre- and postoperative.

TABLE 5. SUBDIAPHRAGMATIC FREE AIR POST ILEAL PERFORATION ON PREOPERATIVE UPRIGHT FILM OF ABDOMEN

Classification	Number of Patients Having Upright Film of Abdomen	Positive for Free Air	%
Systemic	4	2	50
Enteric:			
Acute	28	10	35
Subacute	21	14	66.6

OPERATIVE FINDINGS

All surgery was performed under endotracheal general anesthesia. At operation the peritoneal cavity was found to contain a large amount of foul smelling, semi-viscid brownish fluid. The coils of small bowel, while covered with a thick gelatinous exu-

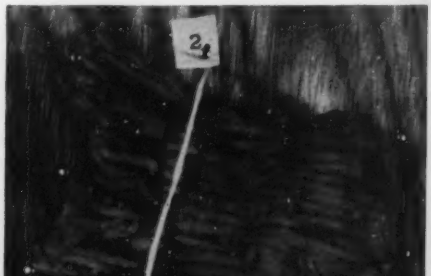

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FIG. 1. 406 MGL No. 13030. Ileum. SJK. (1) Ulcers with perforation; (2) String along line of mesenteric attachment.

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FIG. 2. 406 MGL. No. 13029. LKB. (1) Ulcers with perforations; (2) Lymph nodes; (3) Mesenteric border.

date, and adherent together, were easily separated. The most intensive area of involvement in all cases was the ileum. The ileum was usually found deep in the pelvis, and covered with a thick coating of fibrin. While the remainder of the gastrointestinal tract showed only secondary serosal involvement, the involved segment of ileum was markedly thickened, indurated, and edematous with plum like discoloration. This severe involvement was segmental in distribution, for in all cases the ileum immediately proximal to the ileocecal valve was collapsed, and except for minimal secondary serosal changes, appeared not to be involved in the proximal ileal disease. This non-involved segment of ileum immediately proximal to the cecum usually averaged between ten and twelve centimeters in length. Again, this abrupt transition from diseased to normal ileum was found proximally, and this gross change in bowel texture, color and caliber was used as the criterion of resection level. The involved segment of ileum usually averaged approximately forty-five centimeters in length. All perforations were found in the diseased loop of ileum, and all were distributed along the anti-mesenteric border. The perforations were either single or multiple, varying in size from 0.2 to 0.4 centimeters. Additional areas of marked thinning of the ileal wall were distributed along the anti-mesenteric border. These areas of thinning measured from 0.2 to 2 centimeters in diameter. The mesentery was markedly indurated and thickened directly opposite the diseased ileum, and contained numerous large friable lymph nodes. Further exploration and palpation of the abdominal organs revealed enlargement of the spleen in a number of patients (Table 6). Splenic enlargement was found in forty per cent

TABLE 6. SPLENIC ENLARGEMENT ON PALPATION AT SURGICAL EXPLORATION

Classification	Enlarged Spleen	Normal Spleen	No Mention
Systemic	3	3	3
Enteric: Acute	7	11	27
Subacute	8	12	11

(40%) of those patients surgically explored in whom this finding was noted in the operative report.

The following operative technique was used in the vast majority of our cases: Aspiration of as much of the purulent exudate, fluid and fecal material as possible. Resection of the diseased segment of ileum, and primary open type end to anastomosis was performed in all but seven of the eighty-three operative procedures. Simple closure of the perforation was performed in a few patients. Most cases were drained postoperatively, either through the incisional area or through a lateral stab wound site. Antibiotic therapy, parenteral fluids, and intestinal decompression were continued during the postoperative period. Oral feeding was usually reinstituted on the fourth or fifth postoperative day. Rice, being the staple food of the orient, was given diluted with milk initially, and later whole rice and fish were the main diet.

The additional finding of roundworm (Ascaris Lumbricoides) infestation noted at surgery was deemed worthy of recording since they have been accused of causing bowel perforation. Ascaris lumbricoidi were palpable within the lumen of the small bowel in fifteen patients, while in an additional eight patients the roundworm was found free and alive in the peritoneal cavity at the time of surgical exploration. This occurrence will be completely evaluated in a future publication.

A summary of the operative procedures in all cases is as follows:

	Patients
Resection of the Ileum with Open Primary End to End Ileal Anastomosis	76
Primary Closure of the Ileal Perforation	4
Exteriorization of the Ileal Perforation	2
Resection of the Ileum and Ileo-Transverse-Colostomy	1
Only Exploration	2
Total	85

The average length of ileum resected was 48.2 centimeters.

NUMBER OF PERFORATIONS AND DISTANCE FROM ILEOCECAL VALVE

The perforations of the ileum were single in sixty-seven patients, and multiple in thirteen patients. A breakdown as to the number of perforations found in each individual sub-group is shown in table 7.

The location of the ileal perforation with regard to its distance from the ileocecal valve is shown in table 8.

PATHOLOGY

Gross. A complete pathological review will be written by others, but a brief description of the gross and microscopic picture is as follows:

The ileum was found dilated, thickened, and covered with a brownish exudate, and with external evidence of peritonitis. On opening the resected ileum, the previously described thinning of the wall was found to represent mucosal ulcerations.

All ulcerations were transverse, i.e., the long axis of the ulcer ran perpendicular to the long axis of the bowel. All ulcerations were on the antimesenteric border. The depth of ulceration varied from minimal penetration to full perforation. The number of ulcerations in a single resected specimen varied from one to nine, with an average of four per specimen. The mucosal ulcerations ranged from 1.0×0.2 centimeters to 2.5×1.5 centimeters in size. The perforations were all located in an ulcer, and varied in diameter from 0.2 to 0.4 centimeters. Rolled edges with a dirty base best describes the ulcerations. The areas of ileum between

TABLE 7. NUMBER OF PERFORATIONS OF ILEUM PER PATIENT FOUND ON SURGICAL EXPLORATION

Classification	One Perforation	Two Perforations	Three Perforations	Four Perforations	No Perforation Found
Systemic	8	1	0	0	0
Enteric:					
Acute	37	4	1	0	2
Subacute	22	4	2	1	3

the individual ulcerations showed only edema of the mucosal folds. The mesentery was edematous, and varied from one to three centimeters in width. Numerous enlarged nodes were found throughout the mesentery, largely opposite the ileum.

A typical microscopic report is as follows:

"The perforation is lined by granulation tissue and occurs through a region of Peyer's Patch. Contiguous submucosa is profusely infiltrated by mixed inflammatory cells. Serosa is markedly thickened, edematous, vascular and covered by necrotic cellular exudate. Sections through the grossly described roughened foci show Peyer's patches manifesting reactive hyperplasia and associated edematous submucosa and moderate inflammatory cell infiltration. There are a few foci of superficial mucosal ulceration as well as deeper ulceration into the muscularis externa.

"Lymph nodes show focal histiocytic aggregates and some reticulum cell hyperplasia."

TABLE 8. LOCATION OF PERFORATION OF ILEUM FROM ILEOCECAL VALVE

Distance from Ileocecal Valve	Number of Perforations	Percentage
0–10 cm.	3	3.4%
11–20 cm.	30	34.5%
21–30 cm.	39	44.8%
31–40 cm.	10	11.1%
41–50 cm.	1	1.1%
51–60 cm.	3	3.4%
61–70 cm.	0	0
71–80 cm.	1	1.1%

Pathological diagnosis given in all specimens was as follows:

"1. Enteritis, acute, with ulceration and perforation.
2. Peritonitis, acute, due Dx #1.
3. Reactive hyperplasia, mesenteric lymph nodes."

The above pathology report was made by the 406th Medical General Laboratory.

INVESTIGATIVE STUDIES

In attempting to determine the etiological factor responsible for these acute perfora-

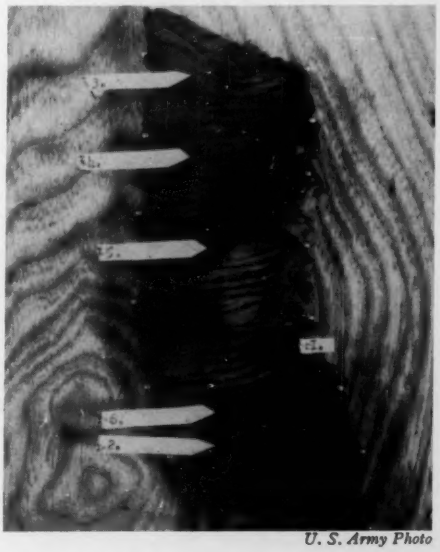

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FIG. 3. 406 MGL. No. 13031 HYS. (1) Mesenteric border; (2) Ulceration with perforation; (3-6) Peyer's patches (?).

TABLE 9. RECOVERY OF PARATYPHOID BACILLI FROM ILEAL ULCERS

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Month	Specimens Cultured	Number Positive	Salmonella Types Recovered
January	19	4	All paratyphi
February	44	7	All paratyphi
March	35	3	All paratyphi
April	11	2	One paratyphi One schollmuelleri
Totals	109	16	15 Paratyphi 1 Schollmuelleri

tions of the ileum, various studies were undertaken. Investigative procedures were performed by the personnel of the combined laboratory facilities of the 3rd and 14th Field Hospitals and the 8217th Mobile Medical Laboratory. Serum agglutinations (Widal) and blood cultures were performed either pre- or postoperatively. Cultures directly from the ulcers in the resected ileum were taken, and finally stool cultures were performed postoperatively.

All Salmonella isolates were subjected to antigenic analysis, and classified according to the Kauffman-White schema. In those instances where the specific sera were not available, final identification was made at the 406th Medical General Laboratory. A complete review of the bacteriological isolation and identification during this outbreak has been excellently presented and published by Zimmerman et al.,[5] and will not be represented at this time. Tables 9 and 10 are reprinted from their original presentation. No additional enteric pathogens were found on blood, stool, or ulcer cultures.

MORTALITY

The mortality figure is only for operative cases, and is based on fifteen of the above described and classified patients, and thirty-five consecutive patients operated upon during the month of March, 1951. Eighteen of these thirty-five patients operated upon in March are also included in the previous classification and discussion (Table 12).

Further breakdown of the mortality rate as to the period of time elapsing between perforation of the ileum and operative intervention for thirty-three patients is shown in Table 13.

DISCUSSION

A review of the literature reveals only approximately thirty-two cases of intestinal perforation during the course of paratyphoid fever. Of these thirty-two cases, probably only one was due to Salmonella paratyphi (Paratyphoid A).[7,8]

It is well to remember the geological area in which this epidemic developed. The occurrence of abdominal cramps and simple diarrhea in the Korean native population is endemic, and unless the abdominal pains were severe, and the diarrhea profuse or bloody, no treatment was sought. It has been shown by others[6] that on stool examination of 1,726 Korean prisoners of war 97.5 per cent were found to be infested with one or more species of protozoa or helminth. The clini-

TABLE 10. RECOVERY OF SALMONELLA FROM 73 PATIENTS WITH PERFORATED ILEAL ULCERS

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Salmonella Types Recovered	Patients with Positive Cultures	Ileal Ulcers	Stool Cultures	Blood Cultures
Paratyphi	14	10	1	6
Typhosa	1	0	1	1
Choleraesuis	1*	0	0	1

* S. paratyphi was recovered from this patient's surgical specimen.

TABLE 11. BRIEF SUMMARY OF THIRTY-THREE PATIENTS WITH PARATYPHOID FEVER COMPLICATED BY INTESTINAL PERFORATION

	Patient's Name	Age	Classification	Time Interval Between Perforation and Hospitalization	Number of Perforations of Ileum	A Length of Ileum Resected	Operative Procedure	Outcome	Comment
1	LDT	—	Systemic	8 days	1	26 cm	Resection of ileum	Recuperating	Seen 8 days postoperative condition satisfactory
2	HYS	27	"	5 days	1	150 cm	"	Recovered	Seen on 27th postoperative day condition fine
3	KYS	21	"	5 days	1	105 cm	"	Recovered	Developed wound infection. Discharged to duty 2 months postop.
4	YYH	26	Acute enteric	14 hours	1	50 cm	"	Recovered	Discharged to duty 3rd postoperative week
5	CWH	34	"	24 hours	1	52 cm	"	Recuperating	Seen fourth day postop. Condition fine
6	KJV	28	"	7 days	1	52 cm	"	Recuperating	7 days postop. Condition fine
7	LHS	25	"	5 days	2	52 cm	Resection of ileum & double barrelled ileostomy	Expired	—
8	KGS	—	"	4 days	1	79 cm	Resection of ileum	Expired	Preoperative x-ray finding of left lower lobe consolidation
9	HMS	28	"	3 days	1	15 cm	"	Recuperating	10th day postoperative condition fine
10	JSB	—	"	1 day	1	26 cm	"	Recovered	3rd postop. week discharged to duty
11	SJK	21	"	8 days	1	26 cm	"	Recovered	Developed wound infection. Discharged to duty 2nd month postop.
12	KMC	23	"	4 days	1	26 cm	"	Recuperating	Developed fecal fistula 7th day postop. One month later up. Thin slight fistula
13	KBH	32	"	24 hours	1	52 cm	"	Recovered	2 weeks postop. Condition fine
14	LJH	38	"	4 days	2	154 cm	"	Expired	—
15	OJW	25	"	24 hours	1	0	Primary closure of perforation	Recovered	Seen 3 months postop. On duty incision well healed
16	HYJ	34	"	7 days	0	0	—	Recovered	Generalized peritonitis at surgery—roundworm free & alive in peritoneal cavity. Wound inf.
17	KHH	29	"	10 days	1	33 cm	Resection of ileum	Expired	Developed fecal fistula postop.
18	KSK	23	"	12 hours	1	26 cm	"	Recovered	Discharged to duty 7 weeks postop.
19	CIS	26	"	2 days	1	26 cm	"	Recovered	Discharged to duty 7th week postop.
20	HKH	26	Enteric subacute	4 days	1	70 cm	"	Recovered	Slight wound infection three weeks postop.

TABLE 11—(*continued*)

	Patient's Name	Age	Classification	Time Interval Between Perforation and Hospitalization	Number of Perforations of Ileum	A Length of Ileum Resected	Operative Procedure	Outcome	Comment
21	CSB	21	"	—	3	52 cm	"	Expired	Was being treated in the hospital for acute enteritis when peritonitis developed
22	JOS	30	"	5 days	1	39 cm	"	Recovered	Discharged to duty 10 weeks postop.
23	MTY	29	"	2 days	1	26 cm	"	Recuperating	Up & about 7 days postop.
24	BCH	28	"	4 days	1	52 cm	"	Recovered	16 days postop. Up & about, condition satisfactory
25	OVS	26	"	3 days	1	0	1) Primary closure of perforation 2) Exteriorization of ileum	Expired	6th postop. day developed fecal fistula. 7th postop. day reexplored & two new perforations of ileum found. Previously sutured perforation showed no leakage. Exteriorization of ileum procedure performed. Patient expired after second operation
26	KSD	22	"	21 days	2	26 cm	Resection of ileum	Recovered	Two months later discharged to duty. Old adhesive peritonitis & bowel mobilized with difficulty. Salmonella paratyphi isolated on culture of ileal ulcer
27	KSY	27	"	3 days	1	30 cm	"	Recuperating	Nine days postoperative has a fecal fistula (healing)
28	KMD	19	"	8 days	4	33 cm	Resection of ileum	Expired	Died first day postoperative
29	KYS	28	"	3 days	0	75 cm	"	Recovered	Fecal peritonitis at surgery, no perforation found, ileum diseased, therefore resected. Three weeks postop. Fine
30	STS	17	"	3 days	1	30 cm	"	Expired	Died immediately postop. period
31	HJS	24	"	5 days	1	60 cm	"	Recuperating	3rd day postop. condition satisfactory
32	LJN	21	"	5 days	1	60 cm	"	Recuperating	Immediate postop. condition very good
33	KHS	31	"	18 hours	1	75 cm	"	Recuperating	Immediate postop. condition very good

All patients listed as recuperating completely recovered.

cal diagnosis of abdominal pain and diarrhea is very unreliable, and to differentiate "simple diarrhea" from Salmonellosis, Amebic, Shigella and Staphylococcal enteric infections, laboratory diagnosis is imperative. The above has been stated because one unusual aspect of this outbreak of perforations of the ileum due to Salmonella paratyphi was that no concommitant medical outbreak of paratyphoid fever was seen. This can only be explained by stating that the paratyphoid fever infection was present, but because of its medical mildness or the endemic nature of bowel dysfunction in this

TABLE 12. OPERATIVE MORTALITY

Total Number of Patients	Recovered	Expired	Percentage
15	12	3	20%
35	27	8	22.8%
—	—	—	—
Total 50	39	11	22%

geological area, the patients did not present themselves for medical treatment until intestinal perforation and peritonitis occurred. While paratyphoid fever infection has been well described by numerous authors before, I, on careful perusal of the literature at my disposal, was unable to find any previous group of cases in which spontaneous perforation of the ileum was the presenting symptom, rather than a complication during the course of the disease. In forty-five patients classified as Acute Enteric, the presenting symptom of the Paratyphoid infection was acute perforation of the ileum. While this aspect has been recorded about typhoid fever, I was unable to find a similar occurrence in the Paratyphoid A literature. This complication, ileal perforation, would appear to be much more prevalent in paratyphoid fever than previously described. The delay between perforation and hospitalization is understandable when one considers the conditions prevailing at the time. The exact time of infection is not known, and may have taken place prior to being captured, while being transported, or in the prisoner of war compounds. The epidemiological aspect is beyond the scope of this paper.

The current therapy advised by others for the management of the intestinal perforation complication of paratyphoid fever is a nonoperative supportive, watchful, peritonitic regime. This approach is based, I believe, on the expanding antibiotic coverage and the high operative mortality (forty to seventy per cent) in the management of typhoid fever intestinal perforations. This presentation is concerned only with paratyphoid fever. Since there are so few recorded cases of either the operative or nonoperative treatment of intestinal perforation during the course of paratyphoid fever, no comparative mortality chart can be composed. The operative management and its mortality have been presented, and the most encouraging aspect is the zero mortality in the nine patients undergoing surgery within two days of peritoneal soilage. An important factor in all the oriental patients surgically explored was the conspicuous underdevelopment of the omentum, and therefore an important protective body mechanism was absent. Resection of the involved ileum, rather than primary closure of the ileal perforation, was the operative procedure of choice for several reasons, one of which was the initial experience of the author when he performed primary closure of the ileal perforations in two patients, only to have a recurrence of ileal perforation in each patient during the postoperative period. One patient was reexplored, and while the previous perforation was closed

TABLE 13. MORTALITY RATE IN RELATIONSHIP TO ELAPSED PERIOD OF TIME BETWEEN INTESTINAL PERFORATION AND SURGICAL INTERVENTION

Time Elapsed Between Intestinal Perforation and Surgical Intervention	Total Number of Patients Undergoing Surgical Intervention	Number of Patients Expired	Mortality Percentage
0– 2 days incl.	9	0	0
0– 3 days incl.	14	2	14.2%
0– 4 days incl.	19	3	15.7%
0– 5 days incl.	25	4	16%
0–10 days incl.	32	7	21.8%
0–21 days incl.	33	8	24%

and showed no leakage, two new perforations of the ileum were found. At this time the bowel was exteriorized, but the patient expired. The other patient was reexplored at autopsy, and a new ileal perforation was found, with the initial perforation still closed and healing. Therefore, to prevent further progression of the ileal ulcerations to perforation the diseased segment was resected. The second reason for resection of the ileum was the thought that not only was the perforation corrected, but the entire foci of infection was eradicated since the lymphatic tissue, Peyer's patches, in the ileum appeared to be the foci of infection closely resembling that found in typhoid fever. Direct end to end anastomosis of the ileum was performed, since in all cases there was a relatively clear area just proximal to the ileocecal valve. All perforations were on the antimesenteric border through an ulceration localized predominently in a Peyer's patch. The appendix was not involved, and was not removed in any of the analyzed cases. Splenic enlargement was found in a varying number of cases, but no definite factors were found for its cause. The only complication of note was the development of a fecal fistula in some patients. Thirty-five cases analyzed during March showed this complication in two of the total twenty-seven patients who recovered. Its development was usually on the sixth to seventh day, and its course was usually spontaneous closure.

Comment

Perforations of the ileum have been recorded in a number of conditions, such as tuberculosis,[10] actinomycosis, regional enteritis, ulcerative colitis with ileal extension, nonspecific ulceration, foreign bodies, nonpenetrating abdominal trauma, vitamin deficiency, malnutrition, uremia, parasitic infestation, particularly ascaris lumbricoides, and finally typhoid and paratyphoid fevers. In all, the treatment of the perforation is surgical, and in all the mortality rate is high. Tuberculosis of the bowel is well described in many pathology textbooks. While primary bowel lesions are rare, the ulcerative small bowel lesions are almost always secondary to pulmonary tuberculosis. Actinomycosis is usually of the upper gastrointestinal tract or in the large bowel, and usually the causative agent can be isolated and identified. Nonspecific regional enteritis affects a variable length of the lower part of the ileum, with often more than one area of bowel involved, and occurring mainly in young adults. The disease is diffuse, and starts as an acute inflammation, and often runs a chronic course, ending usually in stricture formation. Regional enteritis and ileal involvement by ulcerative colitis are fairly common today, although perforations are rare. In all of the above diseases the perforation is caused by a slow burrowing process allowing the submucosal tissue to thicken, development of adhesions, and a walling off process in the event of serosal perforation, with the usual formation of an abscess or a fistula. Nonspecific small bowel ulceration and perforation have been reported, and usually stated to involve the jejunum, and may be part of Crohn's disease. As yet no specific causative agent has been identified. Foreign bodies causing perforation are common and self-evident. The completely negative history for abdominal trauma, and the absence of any signs of bruising trauma to the abdomen, negated the possibility of nonpenetrating abdominal trauma as the cause of the perforations. Vitamin deficiency and malnutrition perforations, while reported in animals, have not been substantiated in those reported in man. In intestinal ulcerations and perforation due to uremia, it appears that the vascular system may be the point from which ulceration and perforation proceeds, and that not only vessels of the kidney are involved, but the whole vascular tree shows sclerosis, and so the gastrointestinal pathology is a fundamental phase of uremia, and not a complication. Parasitic infestation, particularly by ascaris lumbricoides, has been reported as the sole cause of perforation. This is a

questionable entity. Typhoid fever is complicated very often by ileal perforation, and is identical to those caused by the rarer paratyphoid fever.

Conclusion

1. Intestinal perforation of the ileum is a much more common complication of paratyphoid fever than previously considered.

2. Acute free intestinal perforation and peritonitis may be the presenting symptoms of paratyphoid fever.

3. Blood, ileal ulcers, and stool cultures should be performed in all patients with perforations of the ileum to determine if an enteric pathogen is the causative agent.

4. Roentgenograms of the abdomen are valuable aids in the diagnosis when air is present under the diaphragm. When gas is not visualized, it does not exclude the possibility of perforation of a hollow viscus.

5. Operative intervention is the treatment of choice, and the prognosis is in direct ratio to early operation.

6. Resection of the entire diseased ileum and primary end to the end anastomosis of the remaining ileum is the operative procedure of choice in cases of paratyphoid fever complicated by intestinal ulceration and perforation.

7. Enlargement of the spleen may or may not be found, and is probably dependent on other factors than the paratyphoid infection.

8. All ulcerations and perforations are located on the antimesenteric border of the diseased ileum in paratyphoid fever.

Summary

The experiences in Korea during an outbreak of perforations of the ileum due to paratyphoid fever, occurring among North Korean prisoners of war, have been presented. Eighty-five patients of a total group of 203 patients with proven ileal perforation who underwent surgical treatment have been analyzed. The mortality rate was twenty-two per cent for all cases, and zero per cent for those surgically corrected within two days of their perforation and resultant fecal peritonitis.

It is understandable that the future may see American military surgeons again exposed in various geological areas to paratyphoid fever and its complications, particularly intestinal perforation. It is hoped that the above presentation will enable them to make an early diagnosis and render the correct therapy.

References

[1] Siler, J. F. and Gambie, J. C., Jr. Typhoid and the Paratyphoid Fevers. Ibid. 9:15-60 (1928).

[2] Syverton, J. T., Ching, R. E. (et al.) Typhoid and Paratyphoid A in Immunized Military Personnel. J. Am. Med. Ass. 131:507-514 (1946).

[3] Tullis, J. L. Typhoid in Previously Immunized Subject. War Med. 7:95 (Feb. 1945).

[4] Smith, L. A. Salmonellosis; Experiences in Military and Civilian Practice. Gastroenterology 9:551-556 (1947).

[5] Zimmerman, L. E., Cooper, M. and Graber, C. D. Bacteriologic Studies in Outbreak of Salmonellosis in Korea with Special Attention to Salmonella Paratyphi and Perforations of Paratyphoid Ulcers. Am. J. Hyg. 56:252-264 (Nov. 1952).

[6] Brooke, M. M., Swartzwelder, C. (et al.) Intestinal Parasite Survey of Korean Prisoner of War Camp. U. S. Armed Forces Medical Journal Vol. 7: No. 5:708-714 (May 1956).

[7] Zeidman and Randall, C. C. Intestinal Perforation in Paratyphoid Due to Salmonella Paratyphi B. Arch. Path. 41:322-326 (1946).

[8] Oppenheim, A. and Maynard, A. de L. Intestinal Obstruction and Perforation Due to Salmonella Paratyphi. Harlem Hospital Bulletin VI:84-89 (Sept. 1948).

[9] Dunkerley, G. E. Perforation of the Ileum in Enteric Fever. Brit. M. J. 2:454-457 (Sept. 28, 1946).

[10] Talwalkar, R. G. Perforation of Intestinal Tuberculosis Ulcer. British Medical Journal No. 4935:362 (August 6, 1955).

[11] Crohn, B. B., Ginzburg, L., and Oppenheimer, G. D. Nonspecific Granulomata of the Intestines. Annal of Surgery Vol. XCVIII:1046 (1933).

[12] Garner, B. O., Claugus, C. E., and Hamilton, J. E. Acute Perforation of Jejunum Secondary to Primary Jejunitis. Ann. Surg. 134:131-134 (July 1951).

[13] Crandon, J. H., Kinney, T. D. and Walker, I. J. Perforation of Ileum Following Late Ileostomy for Ulcerative Colitis. New England J. Med. 230:419-421 (April 6, 1944).

[14] Bosworth, B. M. Perforation of the Small In-

testine from Nonpenetrating Abdominal Trauma. American Journal of Surgery 76:472-479 (Nov. 1948).

[16] Counseller, V. S. and McCormack, C. J. Subcutaneous Perforation of the Jejunum. Ann. Surg. 102:365 (1935).

[17] Poer, D. H. and Woliver, E. Intestinal and Mesenteric Injury Due to Nonpenetrating Abdominal Trauma. J. Am. Med. Ass. 118:11 (1942).

[18] D'Ingianni, V. and D'Ingianni, H. A. Rupture of the Ileum in Uremia. New Orleans M. & S. J. 98:406-408 (March 1946).

[19] Milwidosky, H. and Barzilax, B. Free Perforation and Recovery in a Case of Regional Ileitis. Gastroenterology *27*:1:113-20.

[20] Kazokov, P. T. Penetration of Ascarides into Abdominal Cavity. 2 cases. Soviet Medicine No. *2*; 5:35, 41.

SOCIAL SECURITY TAX DEDUCTION RATES

Pay grade	Under 2	Over 2	Over 3	Over 4	Over 6	Over 8	Over 10	Over 12	Over 14	Over 16	Over 18	Over 22	Over 26	Over 30
Commissioned Officers														
O-8....	$26.17	$26.17	$27.49	$27.49	$27.49	$27.49	$27.49	$27.49	$27.49	$27.49	$27.49	$27.49	$27.49	$28.72
O-8....	23.92	23.92	25.24	25.24	25.24	25.24	25.24	25.24	25.24	25.24	25.24	25.24	25.24	26.47
O-8....	21.67	21.67	22.99	22.99	22.99	22.99	22.99	22.99	22.99	22.99	22.99	22.99	22.99	24.22
O-7....	18.01	18.01	19.13	19.13	19.13	19.13	19.13	19.13	19.13	19.13	19.13	19.13	20.36	21.76
O-6....	13.34	13.34	14.22	14.22	14.22	14.22	14.22	14.22	14.22	14.74	16.15	16.85	17.55	18.25
O-5....	10.67	10.67	11.41	11.41	11.41	11.41	11.41	11.93	12.64	12.99	13.69	14.39	15.09	15.09
O-4....	9.00	9.00	9.65	9.65	9.65	10.18	10.88	11.23	11.58	11.93	12.64	12.99	13.34	13.34
O-3....	7.34	7.34	7.90	8.42	9.13	9.48	9.83	10.18	10.53	10.88	11.23	11.58	11.58	11.58
O-2....	5.84	6.17	7.55	7.55	7.90	8.25	8.60	8.95	9.30	9.30	9.30	9.30	9.30	9.30
O-1....	5.00	5.34	6.67	6.67	7.02	7.37	7.72	8.07	8.42	8.42	8.42	8.42	8.42	8.42
Warrant Officers														
W-4...	$7.49	$7.99	.....	$7.99	$8.34	$8.69	$9.04	$9.48	$10.18	$10.53	$10.88	$11.23	$11.58	$11.93
W-3...	6.81	7.28	.....	7.28	7.46	7.63	7.81	8.07	8.42	8.60	9.13	9.63	9.98	10.33
W-2...	5.96	6.32	.....	6.32	6.49	6.84	7.20	7.55	7.88	8.05	8.40	8.75	9.10	9.45
W-1...	4.94	5.65	.....	5.65	6.00	6.44	6.62	6.88	7.06	7.23	7.58	7.93	8.28	8.28
Enlisted Members														
E-7....	$4.64	$5.00	.....	$5.18	$5.35	$5.70	$5.88	$6.14	$6.32	$6.49	$6.84	$7.20	$7.55	$7.55
E-6....	3.96	4.21	.....	4.39	4.83	5.00	5.27	5.44	5.62	5.79	6.14	6.49	6.49	6.49
E-5....	3.27	3.69	.....	4.12	4.30	4.56	4.74	4.91	5.09	5.27	5.44	5.79	5.79	5.79
E-4....	2.75	3.16	.....	3.60	3.77	4.04	4.21	4.39	4.56	4.74	4.91	4.91	4.91	4.91
E-3....	2.24	2.63	.....	2.98	3.16	3.33	3.51	3.60	3.69	3.69	3.69	3.69	3.69	3.69
E-2....	1.93	2.28	.....	2.46	2.63	2.81	2.98	2.98	2.98	2.98	2.98	2.98	2.98	2.98
E-1....	1.87	2.22	.....	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40
E-1 (under 4 months).	1.76	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

Early Management of the "Cross Eyed" Individual– Its Importance and Application to the Military Establishment

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WHEN we use the term "cross-eyed" we are referring to the condition where there is misalignment in the gaze of the eyes. This condition is called *strabismus* by most ophthalmologists, and *squint* by some of the older oculists. The latter term is being abandoned because of its confusion with the partial closing of the eyes called squint by the laity.

The term *strabismus* covers all forms of deviation, but since many physicians and most of the laity are unfamiliar with the term, we have used the expression "cross-eyed." More strictly speaking, even in common usage the term "cross-eyed" refers to the condition where the eyes turn in toward each other; the term "wall-eyed" refers to the condition where the eyes turn outward from each other; and the term "cock-eyed" refers to the condition where the eyes deviate vertically from each other. All these conditions are covered by the term strabismus, which may be convergent, divergent, vertical or combined.

In our clinic the incidence of strabismus among military personnel is greater than the combined incidence of all other forms of major eye disease. And, despite its reputation as being a cause for amusement rather than concern, it is by far a more common cause of blindness than all disease we see put together. From the time of Ben Turpin up to the present popularity of Jerry Lewis strabismus has been considered a joke in the same category as the prat-fall and the custard pie. Actually it is a cause of miserable suffering to those afflicted with it and a source of extravagant waste to organizations such as the military, where otherwise able-bodied personnel are rendered cripples. The amazing aspect of this misunderstood disease is that, unlike cancer and heart disease, where prevention is so far impossible, long range planning can practically eliminate this condition from our index.

Of what significance is strabismus to the armed forces? As stated above, it exceeds the combined total of other major eye diseases in its clinical incidence and as a cause of blindness. Yet, here in the Air Force, a strabismus of over fifteen degrees is supposed to be disqualifying for enlistment. It can readily be seen then, that the incidence of this condition among people of military age is even higher than we can estimate, since the majority of gross cases have been weeded out when detected by the entrance physical. The value of fifteen degrees for acceptance is arbitrary, and once a person is in service, even with a strabismus of greater magnitude than that, he may be retained. Now, once such a person is in the armed forces, what is his lot?

First, regulations state that personnel with manifest strabismus may not become officers. Thus, a college graduate from a fine military background, with desirable specialty training can be ruled ineligible for commission because he happens to be "cross-eyed." Secondly, a person with manifest strabismus cannot take flight training, so that many more personnel are lost as potential pilots, navigators, and other air observers. And the distressing part of it all is that by and large this condition is preventable.

So what happens to these people? An attempt is made to train them in other work. It is ridiculous to even try to train them for some jobs, such as operating machinery,

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where depth perception is essential; or driving vehicles, where diplopia can cause death as the "cross-eyed" driver swerves his truck to avoid the projected false image of a bus, and slams into the real bus instead. In other fields the patient is again at a disadvantage. In intensive courses such as electronics, the student cannot compete with normal students, since he can use only one eye at a time. He cannot avail himself of the phenomenon of retinal rivalry, where the constant shifting of fixation from one eye to the other allows the retina in each eye to undergo split-second rest periods, thereby giving the subject a normal amount of protection from fatigue. Patients with strabismus make notoriously poor students, because of the excess strain they suffer in what are ordinary tasks for people with normal vision.

Certainly the patient with strabismus is not welcomed in the provost section. After all, how can one expect a self-respecting offender to take a "wall-eyed" policeman seriously? Nor can a patient derive much confidence from a "cross-eyed" medic. Eventually, many of these patients become cooks, or maintenance helpers, but most of them spend their service time shifting around from one job to another, nursing a grudge which they invariably carry over to the Veterans Administration on discharge.

One may well ask then, Why not simply operate on these cases and cure them? There are two answers to this natural query. First, almost one hundred percent of these cases had the condition prior to entry into the services; and, therefore, strictly speaking, surgical interference is not indicated. Secondly, by the time one reaches the age group of military personnel, the salvage rate has dropped so markedly that one may well wonder it it pays to even bother with them. The importance of age in the consideration of cure is well illustrated in Table 1.

For simplicity we have used round figures in percentages to compare the results obtained in children and in adults, in our clinic. It can readily be seen that in children under the critical age of twelve in an unselected series, approximately ninety percent obtained a good result from treatment. In a selected series (that is, cases nine years of age and under) the percentage of cures went up to ninety-five percent. On the other hand, in an unselected series of adults, the cures were only ten percent; and in a special group selected from the standpoint of intelligence, motivation, potential fusion, etc. the percentage of good results was still only fifty percent. It is, of course, gratifying to know that approximately one-half of properly selected adult cases can be salvaged, but it is still depressing when compared with the ninety-five percent rate in children. And the tremendous disparity of salvage rates in the unselected series of children and adults is particularly dramatic.

TABLE 1

	Good Results	Poor Results
Children		
Unselected cases	90%	10%
Selected cases	95%	5%
Adults		
Unselected cases	10%	90%
Selected cases	50%	50%

What then can be done to alleviate this condition? There is only one approach which will bear fruit, and that is to treat the child with strabismus while he is still young and pliable. The first line of attack here is to educate the parents in the need for examining their children for strabismus. We have been associated with two of the largest charity hospitals on the continent and have been struck by the relatively low incidence of children with strabismus at these clinics as compared with the much higher incidence at our smaller Air Force clinic. Obviously, money does not enter as a factor, since both at the municipal clinics and the military clinic examination and treatment was free. The quality of the medical facility is not a factor either, since the large hospitals were staffed in both cases by university personnel of highest calibre. The difference, obviously,

is in the attitude of the parents toward their children. The parents at the charity hospitals were by and large apathetic and dull, bringing their children to the medical center only when they complained greatly of pain or were obviously deformed. On the other hand, the parents in service were more intelligent and alert, quick to be suspicious of and interested in any apparent abnormality. The former group consisted mostly of unemployed and unemployables, the latter of young people successful in their chosen profession. These parents respond well to teaching by their general practitioners and pediatricians, and it is they who must be convinced of the value of early management.

When is the minimum age for an examination to be undertaken? Three months. Prior to this time the ocular movements are often uncoordinated, since full macular vision is not developed until that age. But after three months binocular fixation can be assumed in a normal child, and the child can be tested.

A great deal can be done with the infant and the pre-school child. It is possible to check the visual acuity of a three-year-old child with the reading chart if the examiner will have the patience. It is true that the three-year-old child will not know the alphabet, but the vast majority of these children can read the position of the "illiterate E" on the vision-testing chart, if one is patient enough to teach them. And vision can be tested on children much younger than that. For years, in laboratory work, the visual acuity of animals has been checked by observing their visual response to the rotation of a striped drum—the phenomenon of "opticokinetic nystagmus." This procedure has been modified to be used with children and infants. An ingenious arrangement is that which makes use of different gauge wire activated by a metronome. The gauge wire which induces following movements in the child's eyes at a specific distance gives an index of the visual acuity.

The refractive status of the child's eyes can be easily determined at any age. After adequate cycloplegia, preferably with topical atropine, it is possible for the refractionist who uses loose lenses to arrive at an accurate appraisal of the dioptric power of the eye. He can then determine the effect of various corrections upon the strabismus, and often can abort the strabismus with suitable lenses.

The presence or absence of strabismus can be readily detected by various tests, the most useful of which is the "cover-uncover" and the "alternate cover" test. Once the child is old enough to fixate, the skilled examiner can tell thereby whether there is any misalignment of gaze, and whether the child has any power to compensate for such an error. When there is a misalignment which is not compensated it is called a heterotropia, or manifest strabismus. And when there is one which is compensated, it is called a heterophoria, or latent strabismus. In heterotropia, covering the fixation eye will cause the other eye to deviate as it assumes fixation, and removal of the cover will allow a shift of both eyes as the uncovered eye takes over again. In heterophoria, alternate covering of the eyes will show alternate movement of the eyes as each in turn assumes the position for fixation while the other deviates beneath the cover.

Therefore, it is readily seen that we have sufficient simple armamentarium for the diagnosis of strabismus at a very early age. It is ridiculous for the parent or the doctor to observe the child for years waiting to see if he will grow out of it. Of course the child will grow out of it if he doesn't have strabismus. Pseudostrabismus can be caused by anatomical variations in the facial features, such as epicanthus, or a wide nasal bridge; it can be caused by optical factors such as variations from the norm in the angle kappa; or it can be caused by ocular anomalies such as heterotopia of the macula. Of course, such cases represent one hundred percent spontaneous cures, since they didn't have strabismus in the first place, despite the apparent deviation of the eyes. Another large group of spontaneous cures is the large mass of cases where there is a tendency for the devia-

tion which is well compensated. This is the heterophoria mentioned above. Such a case would show an intermittent deviation: as, for instance, when the child is tired, or ill, or excited, cases where the compensation is adequate will, of course, undergo spontaneous cure; and cases where it is inadequate will lapse into a manifest strabismus or heterotropia.

When the diagnosis is not made in time, and adequate treatment is not initiated, any of three things may occur, since the two eyes no longer function together as a team. First, the child may see simultaneously with both eyes, thereby suffering a particularly distracting diplopia. Secondly, he may alternately suppress vision with either eye, as he fixes with the other eye. And, thirdly, he may suppress one eye continuously. It is the third of these conditions which is the most serious complication of strabismus.

The eye whose vision is continuously suppressed will progressively lose its vision until it becomes blind—so-called amblyopia exanopsia, or more correctly, suppression amblyopia. In this condition, an eye which is anatomically perfectly normal becomes physiologically non-functioning and blind; and if the condition is not therapeutically reversed in childhood it is a permanent blindness. We have recently seen a very unfortunate example of this in our clinic, where a patient with suppression amblyopia due to strabismus, developed a tiny focus of chorioretinitis in his good eye. Thus, he was rendered blind by an area of inflammation the size of a pinhead, while an anatomically sound eye stood helplessly by, looking on so to speak and seeing nothing.

Suppression amblyopia is fairly easily reversed in childhood by forcing the child to fixate with the poorer eye. This may be done in a variety of ways, but the most effective way is to patch the sound eye completely, until normal vision is attained in the involved eye. The chance of success in achieving good vision in the amblyopic eye falls precipitously with age until by the time the child is six years old it is quite unlikely and by the age of twelve it is impossible. That is why amblyopia in someone of military age is a hopeless precluder of success in the treatment of strabismus.

What is required for the management of strabismus in children? First, and most important, is patience. Most children are afraid of doctors. It may be well worthwhile for the doctor to do nothing put play with the child for the first few visits and make no attempt at examination, for here as in no other branch of medicine, patient cooperation is essential. During these visits the doctor can gain the history and assay the patient in general, while developing the child's trust. A white coat should not be worn, and instruments such as sterilizers, syringes, needles, etc. should not be in view. There should be an ample supply of interesting toys such as squeakers, colored lights, small dolls, puppets, and so on, so the doctor can entertain the child while checking his fixation and ocular movements. A reward such as a lollipop may ensure cooperation at the next visit. This should never be given until the child is ready to leave if one values one's clothes, walls, and equipment. All phases of the examination can be satisfactorily completed if one is patient, but no part of the examination can be accomplished through the closed eyelids of the crying, frightened child.

Secondly, one needs the cooperation of the mother. In so many instances the mother plaintively begs the doctor, "What can I do?" In this condition there is plenty for her to do. She must be prepared to bring the child back for the large number of visits which this ailment requires. She should be instructed in how to teach the child to read the "illiterate E" chart. In cases requiring patching, there is a real challenge to her ingenuity, diligence, and patience, in seeing how she can keep the eye patched. There are many forms of home orthoptics in which the mother can be the child's personal orthoptist, thus freeing trained personnel for fresh or problem cases. About the only limitations on how much the mother can help are her intelligence, interest and industry.

Thirdly, one needs skilled help for optical aides. Glasses must fit perfectly, bifocal segments must be just the right height, shatterproof lenses must be available, there should be no difficulty in fitting prisms, and so on. No glasses at all would be better than an improperly fitted pair which induce secondary strabismus effects because of their inaccuracy.

Finally, a few special instruments are required. These include, besides the usual refracting array, an ophthalmoscope, measuring prisms, colored lenses, some form of stereoscopic and haploscopic device, an interesting array of test objects, and a small paddle for the cover test.

Treatment may be outlined briefly as follows:

1) Good treatment is contingent upon a complete history and an accurate physical examination. In regard to the former, it is of definite help to know the natural progress of the same condition in a parent or an older sibling. One must determine if one is dealing with spontaneous idiopathic strabismus, or that due to specific involvement of a nerve, a nucleus, a muscle, or a disease process, for management will vary. One must know exactly which muscles are involved, and to what extent. One must know if there is any retinal disease present which precludes cure of the strabismus since it is the cause of it. The general health, receptivity, intelligence, and motivation of the patient must be known.

2) If there is any amblyopia, the better eye must be patched or otherwise occluded until equal vision in each eye can be assumed.

3) Prisms are of definite value, especially in small vertical imbalances, and in teaching orthoptics.

4) Drugs such as atropine and DFP may be used. The former may help discourage an inward deviation of the eyes by restricting accommodation, and thereby discouraging the convergence which is reflexly associated with it. DFP is used to produce a peripheral accommodation, which unlike central accommodation can be performed independently of convergence. Caution must be used though, since there is a tendency for iris cyst formation.

5) Lenses are probably the most important single auxiliary. Plus lenses tend to discourage convergence as they depress the accommodative effort, and conversely minus lenses tend to discourage divergence since they elicit an accommodative effect. Bifocals of plus lenses are particularly valuable in cases of accommodative convergent strabismus. Of course, the value of lenses in obtaining maximal acuity of vision requires no elucidation.

6) Surgery is frequently required, and quite often more than one operation is necessary. In our clinic we favor the practice of weakening a muscle opposing the involved muscle in an attempt to restore normal muscle balance. This is much more predictable than trying to restore normal muscle power through the so-called strengthening operations.

7) Orthoptics form an invaluable adjunct to surgery. Often they are of value prior to surgery to help the patient become properly aware of the images in each eye, but more often they are used after surgery to help maintain and strengthen the better alignment which surgery has brought about.

8) The follow-up is an essential portion of the treatment of strabismus. Ideally, the case should be followed from the first time the child has its diagnosis made until the eyes have been straight for several years. Hit and run surgery is to be condemned, since it is unfair to all concerned. Of course, it is understandable that long follow-ups are difficult to obtain in the services, but this need not be so if standardized records are kept, and cooperation between civilian and military doctors is kept at a high level.

The complications of untreated strabismus are numerous and severe. Besides the unfortunate development of blindness, mention must also be made of torticollis, or wry neck, due to vertical muscle imbalance, and habitual head turning due to horizontal muscle imbalance. And perhaps the most touching complication of all is the psychic depression

involved with this conspicuous blemish. Children are notoriously cruel to one another, and the "cross-eyed" child is pathetically sensitive. The change in posture, mien, and attitude toward life and people in some of these children who have their eyes straightened is unbelievably dramatic. If uncorrected, these patients grow up literally afraid to look anyone in the eye.

SUMMARY

The shockingly high incidence of strabismus in military personnel is brought out. The large number of rejections, job restrictions, poor production, and lack of advancement is discussed.

An attempt is made to illustrate that the salvage rate in this group is discouragingly low; but, that if efforts are concentrated on eradicating strabismus in childhood, its eventual incidence in the military age group will be virtually nil.

The conventional methods used in examination and treatment for strabismus are briefly outlined.

NOW—Vaccinate Against Polio—NOW

A Case of Corticotropic Hormone-Induced Psychosis Treated with Promazine Hydrochloride

By

LIEUTENANT DEAN J. PLAZAK, MC, *U. S. Navy**

THE usual psychological response to the administration of adrenocorticotropic hormone or the various corticosteroids is described as deviation and lability in mood, ordinarily towards euphoria.[1,2]

Many theories have been advanced as to the mechanism of this and other more intense psychological responses. Among these theories are the concept of disturbance of biochemical equilibrium, a sudden shift in electrolyte balance, interference with the "feed-back" control mechanism of the pituitary gland, and sudden change from one adaptive level to other.[1,2,3,4,5]

When the emotional reaction is more intense, symptoms of irritability, distractability, a general sense of alarm, intense anxiety and even panic are seen.[2] Occasionally the patient develops an overt psychotic reaction.[1] These varying emotional responses are usually short in duration but have been reported as persisting as long as six months. The reactions of longer duration are thought to represent adjustive devices defending against inadequate psychic adjustment to the sudden changes in metabolic and adaptive level.[3,4,5]

Any of these reactions may occur quite independently of the patient's usual level of apparent emotional stability although the content of the mental response to the administration of the drug will be related to the content of their personality structure.

Reactions as severe as overt psychosis have been reported following a single dose of 20 mgs of corticotropic hormone and abrupt change or cessation of dosage of this hormone or of any of the corticosteroids has frequently been found to precipitate a severe emotional response.[3]

Appropriate alteration of dosage of these medications usually is sufficient therapy but occasionally more intensive psychiatric treatment has become necessary.

The patient described in this report was transferred to the neuropsychiatric service suffering from what appeared to be an acute panic of psychotic proportions with onset three days following the administration of a single dose of corticotropic hormone. She had been receiving regular daily dosages of from 30 to 50 mgs of various corticosteroids for the preceding seventeen months. At the time of her transfer it was decided to begin a clinical course of a newly introduced phenothiazine derivative (promazine hydrochloride) to determine its effect on her psychotic state.

REPORT OF A CASE

A 29 year old white female was admitted to the U. S. Naval Hospital, Bethesda, Maryland, on December 20, 1955. Her chief complaint was one of symptoms of recurrent spontaneous hemorrhages into the skin of her arms, legs, abdomen and face of two years' duration. Onset was after a tooth extraction in July 1954.

Previous laboratory evaluations of her disorder in other Naval hospitals established the fact that her blood plasma was not deficient in any of the normal usual clotting factors but contained an excessive amount of some material found in both her serum and plasma, which was able to inhibit clotting of normal

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The opinions or assertions contained herewith are the private ones of the writer, and are not to be construed as official or reflecting the view of the Navy Department or the Naval Service at large.

The promazine hydrochloride used in the study was supplied as "Sparine" by Wyeth Laboratories, Inc., Philadelphia, Pa.

plasma. It was heat-stable and non-dialyzable, and acted in the first stage of coagulation to prohibit conversion of prothrombin, that is, a circulating anti-thromboplastin. Laboratory evaluations of this substance, carried out by Dr. N. R. Shulman at the Naval Medical Research Institute, revealed that trypsin used *in vitro* corrected the clotting defect in the patient's blood. This suggested that the anti-coagulant was a proteolytic inhibitor, since trypsin combines strongly with these. Such an anti-coagulant with similar properties and action was recently isolated from normal human plasma.[6]

Prior to clinical trial, trypsin was given in intravenous infusions to dogs *in vivo* with no noticeable anti-coagulant effects, in amounts required to completely correct the patient's clotting defects *in vitro*.

The patient then received eight infusions of a twice crystalline preparation of trypsin, 260 mgs in all, over a nine week period.

There were no noticeable clinical effects other than complaints of flushing, tachycardia, and headache at the time of infusion. Epinephrine and slowing of the infusion remedied these. The bleeding and clotting time returned to normal and she had no further hemorrhages.

Prior to discharging the patient from the hospital it was decided to gradually discontinue administration of various adrenal corticosteroids that had been intermittently administered since December of 1954 and continuously since December of 1955. On April 6, she was given an intravenous infusion containing 20 mgs of corticotropic hormone preparatory to reducing her daily dosage of adrenal corticosteroids.

The following day the patient, who ordinarily was rather tense, anxious and had ill forebodings as to her ultimate prognosis, gradually became unusually euphoric, elated, overly optimistic, and energetically assisted with small tasks about the ward. Within three days she began to report disturbing dreams suggestive of severe sexual conflict and attack, and gradually appeared more tremulous, irritable, and anxious to a degree of undifferentiated panic. She became suspicious of the entire medical staff and withdrew to her room. Her personal appearance deteriorated rapidly. Various sedatives and ataractic agents were utilized without apparent success over the next three days. During this period of time, she was receiving about three-fourths of her usual adrenal corticosteroid dosage and receiving no further corticotropic hormone.

She became so intensely disturbed with her severe panic, feelings of impending doom, and fear of others, that by April 13 it was considered advisable to continue her care on the psychiatric service and she was transferred. It was felt that she was suffering from an acute undifferentiated psychotic panic, induced by the introduction of adrenal corticotropin and associated with the sudden change in her dosage of adrenal corticosteroids.

On admission to the psychiatric service she appeared confused, mildly disoriented, unable to concentrate, could not eat or sleep, took little care of her personal hygiene, had strong suicidal ideations, and was excessively concerned over her status to the point of panic. The disturbing dreams continued. It was considered that she could be experiencing visual hallucinations.

On the afternoon of her transfer she was administered 100 mgms of promazine hydrochloride intravenously, over a period of five minutes. Within that period of time she commented that she felt relaxed for the first time in several days and her loss of excessive concern and reduction of tension was apparent. She fell into a light sleep-like state from which she was easily aroused by soft spoken voice. She began eating that evening and slept well that night. She was given an additional 150 mgms of oral promazine hydrochloride at bedtime that night and 100 mgms four times a day orally thereafter. The following day she resumed normal activity, took care of her personal appearance, continued to eat and sleep well, had no further symptoms of anxiety or panic and reported no further disturbing dreams.

She continued to receive 100 mgms of promazine hydrochloride four times a day and

was discharged from the hospital within ten days on that medication. During this time she was able to approach a long standing marital problem never before discussed, and her motivation to return to her home, previously poor, markedly improved. She has remained free of the symptoms and signs displayed while hospitalized, and was last interviewed two months following her discharge.

Discussion

Phenothiazine derivatives are considered to have several possible sites of action. It has been theorized that they may have an inhibiting action on the diencephalic centers or may exert a dampening affect on the arousal mechanism in the reticular substance. These agents have been found to successfully reduce aggressiveness, severe anxiety and fear in both experimental animals and human subjects.[7]

Corticosteroids and corticotropic hormone are thought to bring about an acceleration of the rate of biochemical interchange and to promote mobilization of energy for cellular work. This effect is considered to constitute a source of instinctual tension and institutes a drive to either discharge energy or creates increased need for instinctual satisfaction.[2] This manifests itself in varying psychic symptoms indicating strong response of the arousal mechanism and excessive sympathetic discharge or adrenergic response. If the individual's increased needs cannot be met, various psychic defense structures may be erected to avoid intense anxiety, possibly ultimately by psychotic magnitude. In this particular patient, the onset of the psychic response of psychotic symptomatology was occasioned by her inability to tolerate the sudden alteration in adjustive level due to the sudden reduction in her daily dosage of corticosteroids and the simultaneous introduction of corticotropic hormone.

It appears that administration of a pharmacologic agent which would counteract strong adrenergic reactions and excessive response of the arousal mechanism should obviate the need for the utilization of a psychotic defense structure as a defense. A phenothiazine derivative, promazine hydrochloride, was utilized successfully for this purpose in this patient.

This clinical experience indicates that those ataractic drugs which are derivatives of phenothiazine might well be given further clinical trial in the treatment of transient emotional disorders occasioned by the use of corticosteriods or corticotropic hormone.

Summary

A single case history is presented, involving the successful utilization of a new phenothiazine derivative (promazine hydrochloride) in the treatment of an ACTH-induced transient psychotic reaction.

The pharmacologic basis for this treatment is discussed.

Reference

[1] Rome, H. P.; Braceland, R. J.: Psychological Responses to Corticotropin, Cortisone and Related Steroid Substances: Psychotic Reactions Types, J.A.M.A. 1948:27, 1956.

[2] Fox, H. M., Gifford, S.: Psychological Responses to ACTH and Cortisone, Psychosomatic Medicine 15:614 (June) 1953.

[3] Goolker, P.; Schein, J.: Psychic Effects of ACTH and Cortisone, Psychosomatic Medicine 15: 589 (June) 1953.

[4] Clark, L. D.; Bauer, W.; and Cobb, S.: Preliminary Observations on Mental Disturbances Occuring in Patients under Therapy with Cortisone and ACTH, New England J. Med. 246:205, 1952.

[5] Ebaugh, F. G.: Present Status of ACTH and Cortisone Therapy from the Psychiatric Viewpoint, Am. J. Med. Sc. 221:108, 1951.

[6] Shulman, N. R.: Proteolytic Inhibitor with Anticoagulant Activity Separated from Human Urine and Plasma, Jour. of Biol. Chem. 213:655, (April) 1955.

[7] Seifter, J.; Begany, A. J.; Huber, R.; and Bruce, W. F.: Radnor, Pa. Wyeth Institute for Medical Research, to be published.

Rauwolfia-Barbiturate-Xanthine Mixtures in the Treatment of Hypertension

By
BURTON M. COHEN, M.D.*

UNTIL very recently it was considered that little could be offered the individual with arterial hypertension, save encouragement to develop a state of cheerful symbiosis with his ailment. Lately, the development of a number of effective antihypertensive agents has led to a reappraisal of these traditional concepts of management. It has been amply demonstrated that skillful manipulation of these drugs, when employed singly or in combination, may effect a substantial and prolonged reduction in blood pressure. Unfortunately, while many of these therapies are clearly useful in the hands of experts in special clinics, they are patently unsuitable for the management of the bulk of individuals with high blood pressure, because of the delicate control implicit in their use and the economic hardships attendant upon the hospitalization necessary for the period of individual titration. For this reason, the clinic which is the source of this report, has been engaged in a continuing evaluation of hypotensive drugs which might prove to be suitable for the treatment of the ambulatory hypertensive. This paper is a progress report concerning the treatment of thirty-four patients with moderately severe arterial hypertension with a rauwolfia-barbiturate-theobromine mixture.

MATERIALS AND METHODS

Thirty-four outpatients comprised the study group. All but one were men, reflecting their predominance among the beneficiaries of this clinic. All were suffering from "essential" hypertension. These patients ranged in age from thirty-seven to seventy-three years, and fell into Groups II, III, and IV of the conventional Smithwick classification.[1] Hypertension had been known to these patients for a mean of three and one-half years with a range of from one to fifteen years. Preliminary observations were available for periods of one month to four years with an average period of surveillance of slightly more than one year for the entire group. All patients previously received diets containing less than 1 gram of sodium daily as well as trials with barbiturate theobromine-mixture,† some had been treated with hydralazine or one of the veratrum alkaloids. Prior to the therapy reported, all exhibited a diastolic blood pressure persistently at or above 100 mm. of mercury; azotemia was present to mild degree in thirteen and was of moderate degree in four others. Initial and serial study were carried out by the simple office procedures previously described.[2] All patients were interviewed on the same day each week by the physician throughout the entire period of observation. Blood pressures and pulse rates were recorded in the seated position after a period of casual conversations.

Treatment consisted of continuation of the low-sodium intake; the barbiturate-theobromine tablet was discontinued and tablets which contain Rauwolfia serpentina alseroxylon fraction 1.5 mg., Luminal 0.032 Gm. and theobromine 0.32 Gm.‡ were substituted. Twenty-one patients received these tablets, and thirteen other patients received tablets containing reserpine 0.15 mg., Luminal and theobromine.§ These two groups were similar

* This work was carried out during Dr. Cohen's tour of duty as Chief, Medical Services, U.S.P.H.S. Outpatient Clinic, New York 13, N.Y.

† Theominal (Winthrop Laboratories) contains 0.032 Gm. Luminal® and 0.32 Gm. Theobromine.

‡ Theominal R. S. (Winthrop Laboratories)

§ Theominal R. (Winthrop Laboratories)

as to age, average duration of preceding known hypertension, severity of disease and sphygmomanometric levels (Tables I and II). Treatment was begun with one tablet immediately after breakfast and one tablet at bedtime. After a 10 to 14 day period of preliminary evaluation a mid-day dose was sometimes added.

Results

The duration of therapy averaged 3.7 months for the patients receiving the Rauwolfia alseroxylon fraction and 3.0 months for those on the reserpine fraction. In no instance was it necessary to discontinue treatment because of limiting side reactions.

The group receiving Theominal R.S. exhibited a drop of average mean blood pressure from 144 (197/118) to 121 (164/100) mm. of Hg. (Table I). The thirteen patients treated with Theominal R. demonstrated a decrement of average mean blood pressure from 146 (196/122) to 123 (171/100) mm. of Hg.; this difference between the two groups is not statistically significant. The majority of patients in both groups required only two tablets daily.

Clinical Response

Eight of eleven patients receiving Theominal R.S. and four of seven receiving Theominal R. who had previously suffered from hypertensive headache reported relief from that symptom while under treatment. Angina, exertional dyspnea, "fatigue", and palpitation were lessened in some patients in both groups but no predominate trend was noted in either. Increased appetite, "calmness" and a sense of well-being were reported by many patients.

Table I. Results of Theominal-R.S. Therapy in 21 Male Patients with Hypertension

Patient	Age	Known Hypertension (years)	Smithwick Group	R_x Duration (months)	Blood Pressure Control			Blood Pressure Theominal R.S.			Dose
					S	D	M*	S	D	M	
J.B.	63	?	II	3	230	110	150	160	100	120	b.i.d.
D.M.	61	?	II	5	190	120	143	140	90	106	b.i.d.
F.M.	51	1½	III	2	210	110	143	170	105	137	b.i.d.
N.S.	55	1	III	3	210	110	143	190	120	143	t.i.d.
K.K.	37	1	II	3	155	110	125	150	90	110	b.i.d.
G.C.	52	1	II	3	170	120	136	145	90	108	b.i.d.
L.P.	59	2	II	2½	160	105	123	160	100	120	b.i.d.
H.J.	56	3	III	3	190	110	136	140	70	93	b.i.d.
G.B.	55	1	III	3½	200	120	146	185	95	125	b.i.d.
C.G.	52	5	II	6	200	140	160	150	110	123	b.i.d.
L.R.	59	15	III	4½	210	120	150	180	130	146	t.i.d.
C.E.	48	1	II	3	190	120	143	150	100	116	b.i.d.
J.T.	60	2	II	3	195	115	141	180	100	126	b.i.d.
E.T.	73	6	III	6	220	100	140	150	90	110	t.i.d.
H.G.	51	4	II	4	200	120	146	170	110	130	b.i.d.
F.K.	67	5	III	6	210	130	156	170	95	120	b.i.d.
W.B.	60	2	II	5	160	100	120	150	90	110	b.i.d.
J.W.	58	5	IV	3½	230	140	170	170	110	130	b.i.d.
T.J.	43	10	III	4	190	130	150	170	110	130	b.i.d.
R.G.	53	5	III	4	210	115	146	190	100	130	t.i.d.
F.S.	60	3	II	3	210	140	163	180	110	133	t.i.d.
Average	56.3	3.8		3.7	197	118	144	164	100	121	

* Mean blood pressure was calculated as the diastolic plus one-third the pulse pressure.

TABLE II. RESULTS OF THEOMINAL R. THERAPY IN 13 MALE PATIENTS WITH HYPERTENSION

Patient	Age	Known Hypertension (years)	Smithwick Group	R_x Duration (months)	Blood Pressure Control			Blood Pressure Theominal R.S.			Dose
					S	D	M*	S	D	M	
H.G.	65	5	II	3	180	110	133	170	100	123	b.i.d.
A.B.	46	3	II	2	210	130	156	190	110	136	t.i.d.
M.P.	53	1	III	4	220	140	166	175	100	125	b.i.d.
P.C.	66	12	II	3	190	110	136	170	90	116	b.i.d.
H.D.	47	1	II	3	190	130	150	160	120	133	b.i.d.
W.J.	48	?	II	2	180	120	140	170	90	116	b.i.d.
A.J.	37	10	III	3	220	145	170	165	80	108	b.i.d.
O.Y.	64	1	II	4	215	105	141	180	90	120	t.i.d.
M.D.	67	2	II	2½	200	135	156	170	105	126	b.i.d.
H.H.	71	3	II	1½	210	125	153	180	115	136	b.i.d.
L.P.	48	4	II	2	170	105	126	175	100	125	b.i.d.
L.P.	48	2	II	3½	165	110	128	150	90	110	b.i.d.
J.H.	67	3	III	4½	210	130	156	180	120	140	b.i.d.
Average	55.9	3.9		3	196	122	146	171	100	123	

* Mean blood pressure was calculated as the diastolic plus one-third the pulse pressure.

SIDE REACTIONS

Sixteen patients receiving Theominal R.S. and ten receiving Theominal R. were free from symptoms which could be related to therapy. Approximately equal numbers of both groups reported nasal "stuffiness", lightheadness and diarrhea (Table III).

LABORATORY DATA

Initial laboratory studies were repeated at least once in all patients. In addition to the sphygmomanometric changes, improvement was limited largely to clearing of urinary abnormalities in about half of the patients in both groups. No consistent trend was noted in those patients with azotemia; heart size decreased in some and the electrocardiograph "improved" in others. The fundi have not been significantly altered to date (Table IV).

TABLE III. SIDE REACTIONS

	Theominal R. (Theominal with reserpine)	*Theominal R.S.* (Theominal with Rauwolfia serpentina) alseroxylon)
None	10 (76.9%)	17 (76.1%)
Nasal stuffiness	1	3
Lightheaded	1	1
Diarrhea	1	1
Total	13 (100%)	21 (100%)

COMMENTS

The cardiocirculatory effects of the xanthine derivatives are well-documented.[3] Although they affect all portions of the circulatory system, their effect on a single function such as the blood pressure is the resultant of a complex interplay of actions which are often antagonistic.[4] Although the level of arterial pressure may accordingly remain little altered, an increase in cerebrovascular tone may lead to a diminution in cerebral blood flow, a fall in cerebrospinal fluid pressure and dramatic relief of hypertensive headache.[5] When xanthines are combined with the sedative drugs, a decrement in blood pressure sure may also take place.

Within the past six years, extracts of the plant Rauwolfia serpentina Benth have gained recognition as a useful therapeutic weapon in the treatment of hypertension.[6] It was the purpose of this study to evaluate the possible benefit that might derive from incorporation of Rauwolfia derivatives into the customary barbiturate-xanthine mixture.

TABLE IV. CHANGES FOLLOWING TREATMENT OF PATIENTS WITH HYPERTENSION WITH ORAL RAUWOLFIA-BARBITURATE-XANTHINE MIXTURES*

	Theominal R.S.† (Theominal with Rauwolfia serpentina alseroxylon)			*Theominal R.*‡ (Theominal with reserpine)		
	Improved	Same	Worse	Improved	Same	Worse
Heart Size	3	18	0	1	11	1
ECG	4	17	0	3	10	0
Fundi	2	19	0	1	12	0
Urine	11	9	1	5	6	2
NPN§	3	5	2	2	3	2

* Expressed as the number of patients exhibiting the particular change.
† 21 patients total.
‡ 13 patients total.
§ A total of 17 patients with nitrogen retention in both groups.

The data presented indicate that in the dosage outlined above, the addition of Rauwolfia substances resulted in a definite decrement in systolic, diastolic and mean blood pressures beyond the baseline attained with the barbiturate-xanthine mixture per se. In daily dosage of 3.0 mg. of the alseroxylon fraction (Theominal R.S.) or 0.30 mg. of the reserpine fraction (Theominal R.) equivalent hypotensive responses were noted in the groups under observation. This is confirmatory of the experience of other investigators using similar preparations.[7]

The decrease in frequency and severity of hypertensive headache suggests that these drugs were helpful in many instances. Some patients noted relief from the symtoms of cardiac insufficiency or the coronary arterial syndromes.

Side effects were mild and noted by only one-quarter of each group. These were similar to some of those previously reported with Rauwolfia derivatives,[8] but did not necessitate cessation of treatment in any case. No patient experienced a cerebral vascular accident or a myocardial infraction or developed clinical evidence of uremia during the limited period of observation.

Laboratory follow up documented clearing of urinary abnormalities in many patients, with decrease in heart size and "improvement" in the electrocardiographic tracing in lesser numbers. No consistant trend was observed in patients with nitrogen retention.

SUMMARY

The addition of alseroxylon (Theominal R.S.) or reserpine (Theominal R.), components of Rauwolfia serpentina to Theominal markedly enhanced by hypotensive potency of the latter as determined in the ambulatory treatment of thirty-four patients with moderately severe essential hypertension for a period of three months or more.

Mean blood pressure dropped from 144 (197/118) to 121 (164/100) mm./Hg. with Theominal R.S. and from 146 (196/122) to 113 (171/100) mm./Hg. with Theominal R.

Relief from hypertensive headache, increased appetite, calmness and a sense of well-being were reported by many patients. Urinary abnormalities cleared in about half the patients with some decrease in heart size and electrocardiograph improvement in others.

Patient tolerance was excellent with minor side effects consisting of nasal stuffiness, light-headedness and diarrhea observed in a few patients but none of these necessitated cessation of treatment.

The data presented indicate that the addition of Rauwolfia resulted in a definite decrement in systolic, diastolic and mean blood pressures beyond the baseline attained with the barbiturate xanthine mixture (Theominal) alone, as well as substantial subjective improvement in most patients.

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References

[1] Smithwick, R. H. and Thompson, J. E.: J.A.M.A. 152,1501, 1953.

[3] Cohen, B. M.: Am. Practitioner & Digest of Treatment 6,1030, 1955.

[2] Goodman, L. S. and Gilman, A.: The Pharmacological Basis of Therapeutics. The Macmillan Co. New York, 1955 2nd Ed.

[4] Starr, I. et al: J. Clin. Investigation 16,799, 1937.

[5] Moyer, J. H. et al: Am. J. M. Sc. 224,377, 1952.

[6] Jal Valkil, R: Circulation, 12,220, 1955.

[7] Hughes, W. et al: Am. J. M. Sc. 228,21, 1954

[8] Wilkins, R. W.: Am. J. Med. 17,703, 1954.

WREATH LAYING CEREMONY AT TOMB OF UNKNOWN SOLDIER

It has been customary for several years to hold two days of post convention activities for the foreign members who attend our annual convention. The activities for these foreign members who were present at the 63rd Annual Convention, held in Washington, D.C., November 12-14, 1956 included a wreath laying ceremony at the Tomb of the Unknown Soldier in Arlington National Cemetery. Below are two pictures of those who participated in the ceremony on November 15, 1956. Other activities for the foreign members were a demonstration of the evacuation of sick and wounded by helicopters of the Army, Navy, and Air Force, and a tour of the National Naval Medical Center, Bethesda, Maryland.

Courtesy Dr. Arthur Turner

Courtesy Dr. Arthur Turner

Chemical Factors in Wound Healing

By
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WOUND repair can be accomplished by either of two fundamentally different processes: (1) regeneration of the disrupted tissue, or (2) replacement of the original tissue by fibrous scar. The extent to which the first mechanism progresses is governed by the inherent regenerative capacity of the particular tissue. Since skin and subcutaneous connective tissue have great powers of regeneration, while skeletal muscle must be replaced largely by fibrous tissue, the healing of most surgical wounds or accidental injuries requires both mechanisms of repair. In our present state of knowledge there is little we can do to influence tissue regeneration. The studies of Hammett and Reimann[1] indicated that compounds containing free sulfhydryl groups stimulate regeneration of parts in lower forms and healing of wounds in mammals. The clinical application of thio compounds did not meet with success, however. For practical purposes, therefore, the term "wound healing" implies the repair of defects by fibrous tissue proliferation.

From the histologic standpoint there is little justification for differentiating between primary healing and healing by granulation (first and second intent). The two processes are identical in essence and differ only in scale. In both incised wounds and those resulting from loss of tissue, a fibrin clot is formed which serves as the framework for proliferating fibroblasts and endothelial buds. Under normal conditions collagen is laid down in a few days and the friable granulation tissue gradually becomes a firm scar.

A number of factors are recognized to play a part in the healing of wounds, e.g. size of the defect, age of the patient, blood supply, degree of immobilization, and temperature.[2] The present discussion concerns those factors which are chemical in nature: (1) utilization of protein, (2) role of vitamin C, (3) the effects of certain hormones, (4) pH changes, electrolyte and fluid balance, and (5) some effects of bacterial growth.

Availability and Utilization of Protein

It has been known for many years that malnutrition delays the healing of wounds, since healing requires the formation of new tissue. Like so many generalizations in medicine, however, the ultimate mechanisms involved are somewhat obscure. In experimental animals both the lag phase of fibroplasia and final healing time are prolonged on protein-deficient diets. The bursting strength of abdominal wounds is only about one half that of well nourished animals. Conversely, high protein diets increase the rate of fibroplasia.

Increased plasma levels of many of the essential amino acids in both wounded experimental animals and human casualties point to increased mobilization of protein from the body reserve pool under the stimulus of trauma.[3] Although delayed, wounds do eventually heal even in the starved animal indicating that protein is obtained at the expense of other tissues if an adequate amount is not provided by the diet. Mobilization of this protein seems to be under the control of the adrenal glands. Not only are proteins and amino acids needed as building blocks for the tissue being synthesized, they are also necessary to construct the enzymes required for the process. Protein thus serves a dual purpose: as simply

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structural material and also as a source of specific amino acids or functional groups required in the enzyme systems involved.

Several groups have attempted to define these roles more exactly. With the knowledge that dietary protein as such is not essential for final healing some investigators have reasoned that the important function of protein in the diet is to furnish special molecules or radicles. Since it had been demonstrated that the sulfhydryl group stimulates cellular proliferation, and since methionine is the only essential amino acid furnishing this group, Localio and co-workers[4] studied the effect of this amino acid on wound healing in protein-deficient rats. The tensile strength of experimental wounds in these animals was increased to almost normal values by the addition of methionine alone. These experiments have been confirmed and extended recently by Perez and Ihnen[5] who included a control group of animals fed valine in place of methionine. This amino acid has the same number of carbons and the same amount of nitrogen as methionine. The fact that wounds in this group healed as slowly as those in animals fed no protein at all, while the methionine-fed rats showed normal healing rates indicates that the effect is due to the sulfur group and not to a nonspecific source of nitrogen. Histologically the deficient animals showed persistent edema and inflammation with little proliferation of fibroblasts or capillaries.

Since the effect of protein on wound healing is apparently dependent upon its methionine content, the role of this substance is of interest. This question can not yet be answered but several possibilities can be considered. There is some evidence that methionine increases the efficiency of the utilization of protein. It is well known that a number of enzyme systems depend upon free SH groups and are paralyzed if these groups are blocked. Perhaps methionine supplies this need and enables the body better to utilize body proteins in the face of an inadequate diet. A second alternative is that the sulfur of methionine is incorporated into chondroitin sulfate in the connective tissue matrix. This seems less likely since fibroblastic proliferation precedes the formation of ground substance. Inadequate protein in the diet would increase the severity of edema at the local site which would tend to prolong the healing time.

Level of Ascorbic Acid

Along with defects in bone development and hemorrhages into the tissues, delayed wound healing and even disruption of apparently quiescent scars have been long recognized in clinical and experimental scurvy. Almost all of the effects of a deficiency of vitamin C can be attributed to a defect in the development of the intercellular substances of connective tissue; to be more specific, the fibrillar intercellular substances.[6]

Before discussing the specific effects of vitamin C deficiency it is necessary to digress and inquire into the mechanism of the formation of connective tissue. Although the full answer is not known, there are a number of observations which suggest the course of events. Most investigators accept the concept that the fibroblast elaborates the constituents of the amorphous connective tissue ground substance. Chemically these substances include 5 or 6 polysaccharide esters of sulfuric acid, including the chondroitin sulfates.[7] These are associated with proteins to form the mucoproteins which stain metachromatically due to the presence of the acid groups. Another polysaccharide is present which is not a sulfate ester: hyaluronic acid. It has been suggested that this material is produced by mast cells.

It is agreed by most that collagen fibers are formed by polymerization of the amorphous matrix but the means by which this is accomplished are disputed. Fine fibrils are known to exist within the cytoplasm of fibroblasts but it is doubtful if these are involved directly in the formation of collagen bands. Electron microscope studies have shown that fibrils, formed at the surface or immediately beneath the surface of fibroblasts, peel off and presumably unite to form

heavier fibers which eventually are recognized as collagen. Although there is not universal agreement, it is thought by many that reticulin fibers and collagen are basically the same substance and that the fibrils described above are cemented together in successively larger aggregates by mucopolysaccharides to form first reticulin and finally collagen. The cementing material can be removed by hyaluronidase which causes collagen bands to split up into reticulin fibers.[8] The factors necessary for the formation of collagen fibers are only poorly understood. The addition of mucopolysaccharides, including heparin, to solutions of collagen is capable of precipitating collagen fibers.[9] This observation suggests a role for the mast cells in collagen formation. In tissue cultures of fibroblasts the addition of ascorbic acid results in more rapid production of fibers. Likewise increasing the pH or the addition of NaCl to cultures will cause reconstitution of dissolved collagen fibers.

Although no specific metabolic role has been assigned as yet to ascorbic acid, there is abundant evidence that it is essential for the production of collagen. Microscopic examination of wounds in vitamin C deficient animals and man show that there is no impairment in fibroblastic proliferation, but that these cells remain immature in appearance and are surrounded by a mass of acidophilic, amorphous material which fails to resolve into collagen fibers. Fractured bones show many osteoblasts but inadequate osetoid. The tissues immediately surrounding a wound show an increased level of ascorbic acid in the normal subject but no increase in scorbutic or C deficient individuals.[6] This observation indicates that the action of vitamin C is local rather than systemic. The addition of ascorbic acid to the diet results in the appearance of reticulin within a few days which soon loses its argyrophilic property and stains like collagen (red with van Gieson stain). That the point of action of ascorbic acid is even earlier than the formation of fibers is suggested by measurements of the rate of incorporation of labeled sulfate groups into chondroitin sulfate. In vitamin C deficient animals the rate is only ⅓ that of normal, indicating that the ground substance itself is defective.[10]

It is self-evident that optimum tissue synthesis requires good general nutrition in addition to the specific factors discussed above. Since growing tissue requires increased amounts of nucleoproteins, the B vitamins, especially B_{12} and folic acid are important. In general in clinical patients who have experienced wound disruptions, lack of protein (general malnutrition) is a more important factor than ascorbic acid deficiency alone.

Relationship of Cortisone and Ascorbic Acid

Early in the use of cortisone and ACTH it was found that both compounds, especially the former, cause delay in wound healing. The site of action could be at any or all of three different levels, based on the reports of various observers. Some have found that exudation and therefore deposition of fibrin are suppressed, leading to deficient granulation tissue. If cortisone is withheld for the first 72 hours it has no delaying action.[11] Others have found no difference in the early stages of inflammation and repair but report defective capillary growth and collagen formation.[12] Cannon[13] states that cortisone causes increased catabolism of protein in normal animals and wastage of protein in the replenishment of depleted tissues. Healing is delayed only at higher dosage levels and in his hands ACTH did not impair healing. It is probable that physiologic levels of ACTH and cortisone have no detrimental effect on healing. Since ACTH causes depletion of ascorbic acid stores in the adrenal, it is tempting to associate its effect on healing wounds with its action in ascorbic acid metabolism. Several investigators have shown, however, that the delaying action of vitamin C deficiency is probably an independent effect and is not associated with the adrenal cortex.[14]

pH, Electrolytes, and Fluid Balance

Living cells function within a relatively narrow range of hydrogen ion concentration. It is not surprising, then, that regeneration of tissue and fibroblastic proliferation should be at a maximum within close limits around pH 7.3. Bacterial growth and the breakdown of necrotic tissue both tend to lower the pH at the wound site impairing tissue growth.

Under the influence of the adrenal cortex the body retains sodium and water and loses potassium following trauma. The potassium loss is principally from the uninjured tissues, although potassium is decreased in the traumatized tissues. In addition to the systemic shifts in electrolytes there is local retention of sodium. Extracellular water is also increased at the wound site. These local changes are not affected significantly by ACTH or excess NaCl.[15] The role of the sodium ion in the formation of collagen fibers is brought to mind.

Bacterial Growth

Bacterial contamination in small degree probably has no effect except slight stimulation. Heavy bacterial growth could retard healing by any of several mechanisms: (1) by the release of toxic metabolites, (2) by competition with the tissue cells for essential substances, (3) by physical adsorption of ions to particle surfaces, (4) by the release of enzymes which act either locally or as systemic toxins.[16]

Most bacteria produce acid metabolites from carbohydrate substrates which can accumulate in an infected wound, causing the pH to fall to levels of 5 or 6.[17] Such hydrogen ion concentrations are detrimental to cell growth and proliferation. Many of the pathogenic bacteria elaborate one or more enzymes which produce toxic symptoms by injury to cells in general or to specific types of cells, e.g. hemolysins. A brief consideration of some of the agents which inhibit tissue repair shows that they act by destroying constituents of connective tissue or by dissolving fibrin, thereby delaying the invasion of the defect by fibroblasts. Various strains of streptococci produce streptokinase (fibrinolysin) which activates plasminogen to give plasmin which dissolves fibrin. Streptococci also form cathepsins (proteases), desoxyribonuclease (dornase), and hyaluronidase. Some staphylococci also produce fibrinolysins, which are much slower acting than those of the streptococci, as well as hyaluronidase. The clostridia produce collagenase and hyaluronidase. Serum levels of hyaluronidase-inhibitor are increased in patients with healing wounds.[18]

That the retarding effect is not necessarily due to the presence of bacteria is shown by studying the reaction to various suture materials. The tissue around absorbable sutures is edematous and contains a dense neutrophilic infiltrate. The appearance of collagen is delayed as compared to tissues containing nonabsorbable material which excites little inflammatory response.[19] The presence of large numbers of neutrophiles from whatever cause would be expected to delay repair because of the release of proteases. These enzymes dissolve the fibrin network which is the prerequisite for migration of fibroblasts so that healing must wait until the purulent reaction has cleared.

Summary

Some of the chemical factors influencing the healing of wounds are reviewed. These include: (1) the availability and utilization of protein, (2) the role of ascorbic acid, (3) the effects of the adrenal cortical hormones, (4) pH changes and electrolyte and fluid balance, and (5) the effects of bacterial contamination. Healing is delayed by deficient protein or ascorbic acid, excessive amounts of cortisone, wide shifts in pH, and marked inflammatory reaction. The delay caused by lack of protein can be largely corrected by the feeding of methionine. Ascorbic acid deficiency causes impaired synthesis of intracellular substances including collagen and osteoid which are essential for repair. Bacteria exert an ad-

verse effect on healing in several ways, one of the most important of which is the production of proteolytic enzymes.

References

[1] Hammett, F. S., and Reimann, S. P.: Cell proliferation response to sulfhydryl in mammals. *J. Exper. Med.* 50:445-448, Nov. 1929.

[2] Arey, L. B.: Wound healing. *Physiol. Rev.* 16: 327-406, 1936.

[3] Levenson, S. M.; Howard, J. M.; and Rosen, H.: Studies of the plasma amino acids and amino conjugates in patients with severe battle wounds. *Surg., Gynec. & Obst.* 101:35-47, July 1955.

[4] Localio, S. A.; Morgan, M. E.; and Hinton, J. W.: The biological chemistry of wound healing. I. The effects of dl-methionine on healing of wounds in protein depleted animals. *Surg., Gynec. & Obst.* 86:582-590, May 1948.

[5] Perez-Tamayo, R., and Ihnen, M.: The effect of methionine in experimental wound healing. A morphologic study. *Am. J. Path.* 29:233-243, Mar.-Apr. 1953.

[6] Follis, R. H. Jr.: *The Pathology of Nutritional Disease.* Charles C Thomas, Springfield, Ill., 1948, pp. 130-145.

[7] Meyer, K., Rapport, M. M.: The mucopolysaccharides of the ground substance of connective tissue. *Science* 113:596-599, May 25, 1951.

[8] Pearse, A. G. E.: *Histochemistry.* Little, Brown, and Comp., Boston, Mass., 1954, pp. 81-87.

[9] Morrione, T. G.: Formation of collagen fibers by the action of heparin on soluble collagen: an electron microscope study. *J. Exper. Med.* 96:107-113, Aug. 1952.

[10] Reddi, K. K., and Norstrom, A.: Influence of vitamin C on the utilization of sulfate labelled with sulfur-35 in the synthesis of chondroitin sulfate of the costal cartilage of the guinea pig. *Nature* 173:1232-1233, 1954.

[11] Spain, D. M.; Molomut, N.; and Haber, A.: Biologic studies on cortisone in mice. Science 112: 335-337, Sept. 22, 1950.

[12] Zoger, S.: Observations on the influence of cortisone on tissue response to injury. *Yale J. Biol. & Med.* 25:202-213, Dec. 1952.

[13] Cannon, P. R.: The problem of the metabolic response to injury. *Military Med.* 117:222-228, Sept. 1955.

[14] Schilling, J. A.; Radakovich, M.; Favata, B. V.; Filer, L. J., Jr.; and Jespersen, H. W.: The relationship of vitamin C and ACTH in experimental wounds. *Surg., Gynec. & Obst.* 97:434-438, Oct. 1953.

[15] Schilling, J. A.; McCoord, A. B.; Clausen, S. W.; Whelan, T. J., Jr.; and Kuykendall, S. J.: Electrolyte changes in healing muscle wounds in the dog. *Surg., Gynec. & Obst.* 97:162-166, Aug. 1953.

[16] Dubos, R. J.: *Chemical Determinants of Microbial Diseases.* Harvard University Press, Cambridge, Mass., 1954, pp. 67-78.

[17] Schmelkes, F. C.: Chemical considerations governing the local chemotherapy of wound infections. *Surg., Gynec. & Obst.* 77:69-73, July 1943.

[18] Cole, J. W.; Shaw, D. T.; and Fraser, P.: Wound healing: cutaneous and serum inhibition of hyaluronidase. *Surg., Gynec. & Obst.* 90: 269-274, Mar. 1950.

[19] Localio, S. A.; Casale, W.; and Hinton, J. W.: Wound healing. Experimental and statistical study V. Bacteriology and pathology in relation to suture material. *Surg., Gynec. & Obst.* 77:481-492, Nov. 1943.

Role of Therapeutic Dentifrices in Preventive Dentistry*

By

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INTRODUCTION

DENTIFRICES are usually compounded of abrasives, binding agents, detergents, flavoring agents, and other substances according to the intended use of the dentifrice. They are classified as cosmetics by law, although depending on composition and use, some may have a therapeutic action apart from simply cleaning the teeth.

Such therapeutic dentifrices, containing some added chemical intended to have a specific action in the oral cavity, are of considerable current interest in relation to their role in preventive dentistry, particularly as they may influence dental caries and periodontal disease.

Therapeutic dentifrices were the subject of a symposium at the ninety-fourth meeting of the American Dental Association entitled, "Is There a Therapeutic Dentifrice?"[1] As the title of this symposium implies they are also the subject of much controversy for their practical clinical effectiveness is often in doubt or unproved. Nevertheless, many new dentifrices with a hoped-for clinical therapeutic action have been developed in the approximate decade since World War II, with the accumulation of considerable literature on this subject.[2,3]

Therapeutic dentifrices are not new developments, however, for some currently popular dentifrices were first introduced within the early decades of the present century as "therapeutic" or "medicated" dentifrices. A currently popular dentifrice was originally compounded of pepsin and acid-calcium phosphate as the principal active ingredients with the hope that the pepsin, in an acid medium, would "digest" or "dissolve" dental plaques on the surface of enamel, thereby preventing the onset of dental caries.[4–7] Regardless of the invalidity of the assumption, the dentifrice was widely accepted and is today a very popular one, even though its composition has long since been altered.

Many dentifrices of the same era were compounded of from 10 to 50 per cent potassium chlorate, with the hope that this ingredient would release oxygen, act as an oral antiseptic, and influence or control periodontal disease and dental caries. A dentifrice of this type, whose trade name is still well-known, contained 50 per cent potassium chlorate, and was widely advertised as keeping "the whole mouth—teeth, gums, and all—in excellent order" if "used twice a day" and a dentist was visited "twice a year."[4–8]

Another approach to the formulation of a therapeutic dentifrice was to incorporate emetine as an active ingredient in the belief that it would control *Endamoeba buccalis*, an oral protozoan at that time believed to be a cause of periodontal disease. The percentage composition of one such "medicated" dentifrice (termed "F. E. I." for "first eliminate infection") was as tabulated on the next page.[9]

During the two decades before World War II, very few therapeutic dentifrices were developed and there was a tendency to stress the cosmetic aspect of dentifrices. Since World War II, however, many new therapeutic dentifrices have been developed, most of which are directed towards the prevention of dental caries, although a few claim to prevent or at least influence periodontal diseases.

The substances or compounds that have been incorporated into therapeutic dentifrices

* Presented at the Dental Section of the 63rd Annual Convention of the Association of Military Surgeons of the United States, Hotel Statler, Washington, D.C. November 13, 1956.

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Precipitated chalk (body of paste: cleanser; antiacid)	58.75
Glycerine (vehicle)	28.60
Water (vehicle)	5.60
Starch (binder)	1.10
Soap (cleanser: alkalizer)	5.00
Russian mineral oil (vehicle: lubricant)	0.25
Saccharin (corrective; antiseptic)	0.03
Emetine hydrochloride (endamoebic)	0.0015
Thymol (stimulant and antiseptic)	0.015
Menthol (stimulant and antiseptic)	0.03
Oil of eucalyptus (stimulant and antiseptic)	0.11
Methyl salicylate (stimulant and antiseptic)	0.11
Oil of peppermint (stimulant and antiseptic)	0.40

can be classified into at least five categories according to their composition or action: (1) ammonia and urea compounds, (2) antibiotics, chiefly penicillin, (3) chlorophyllins, (4) fluorides, and (5) antienzyme substances.

Ammonia and Urea Dentifrices

Urea, one of the breakdown products of protein metabolism, is secreted by the salivary glands as a normal constitutent of saliva. While ammonia is present in saliva, it is not thought to be secreted by the salivary glands but formed from the breakdown of urea by the enzyme, urease, as well as being formed from amino acids by deamination.

As early as 1935 Grove and Grove[10] reported that saliva from caries resistant persons contained more ammonia nitrogen than saliva from caries susceptible persons, although even today this concept has been neither proved nor disproved. Other investigators found urea would prevent acid formation in saliva mixtures in vitro,[11] as well as depressing acid formation in dental plaques in vivo.[12-14]

A few years later the investigations of Kesel et al.[15-17] supported the concept that ammonia was the salivary factor that inhibited dental caries by its action on lactobacilli. These findings led to the incorporation of urea-ammonia mixtures into several commercial dentifrices.

Several clinical studies have been made of the efficacy of ammonia and urea dentifrices, the most important of which are summarized in Table I. From the data obtained to date in clinical studies, 5 per cent urea and 2 per cent dibasic ammonium phosphate in a tooth paste, as originally recommended by Kesel et al.,[15-17] does not seem to be effective in controlling dental caries under practical or normal conditions of use. The efficacy of higher concentrations of urea and dibasic ammonium phosphate has not been proven, although, as indicated, several clinical tests have been conducted with such dentifrices.

Penicillin Dentifrices

Penicillin has been incorporated into dentifrices, usually powders, in an effort to control dental caries. The more important clinical studies of the efficacy of penicillin dentifrices in man are summarized in Table II. The concentration of penicillin utilized has ranged from 1000 to 100 units per gram of dentifrice; such dentifrices have been applied in both regimented and nonregimented tests.

The results of the various studies indicate that if penicillin is properly administered in sufficient concentration it will effect a decrease in dental caries in man. The various studies do not agree as to the conditions under which it will do so or have they agreed as to how penicillin inhibits caries.

Studies made of the influence of penicillin-containing dentifrices on dental caries in hamsters[30-32] and white rats,[33-36] indicate that the application of penicillin dentifrices decreases caries incidence in such experimental animals, although again the precise conditions for or the mechanism by which caries is inhibited are not precisely defined.

TABLE I. AMMONIA AND UREA DENTIFRICES

Investigators	Active Ingredients	Composition of Test Groups	Duration of Test	Degree of Caries Inhibition
Kerr and Kesel (1951)[18]	2% dibasic ammonium phosphate and 5% urea	716 children, 10 to 11 years of age	2 years	9% caries inhibition under supervision
Davis and King (1951)[19]	2% dibasic ammonium phosphate and 5% urea	339 individuals, 12 to 31 years of age	9 months	No caries inhibition
Dirks, et al. (1953)[20]	3% dibasic ammonium phosphate and 5% urea	166 school boys, 10 to 14 years of age	18 months	No caries inhibition
Henschel and Lieber (1949)[21]	5% dibasic ammonium phosphate and 22% urea	150 private patients	Control, 7–13 yrs. Test group, 34 mo.	37.5% caries reduction
Lefkowitz and Vente (1951)[22]	22.5% urea	120 children, 5 to 19 years of age		No reduction during first 12 months; 60% reduction after 18 months
Hawes and Bibby (1953)[23]	12% urea and 1% urease	372 children, 7 to 13 years of age	1 year	No reduction in caries activity
Cohen and Donzanti (1954)[24]	3% dibasic ammonium phosphate and 13% urea	169 children, 9 to 13 years of age	2 years	25% reduction

Some of the penicillin studies have indicated a marked reduction in lactobacilli;[26,33,35,37–39] others have reported no reduction even when caries incidence was effectively reduced.[28,40,41] Some investigators[42] have suggested that penicillin is retained for 12 to 24 hours in dental plaques, where it mediates caries reduction by preventing acid production by the resident acidogenic flora but not necessarily by affecting only the acid producing potential of lactobacilli.

Apart from the specific action of penicillin in caries reduction, other important factors to consider in its utilization in dentifrices are the development of penicillin resistant microorganisms among the resident microbial flora, disturbing the normal balance of the oral microbial flora, and the development of hypersensitivity to penicillin by the person utilizing the dentifrice.

There is little evidence that the limited use of penicillin dentifrices has resulted in any great number of penicillin-resistant strains of oral microorganisms. Also, there is little evidence that the use of a penicillin dentifrice seriously disturbs the balance of the resident oral microbial flora.

It would seem logical, however, that if the penicillin concentration of a dentifrice was sufficient to inhibit the growth of a bacterial species or group responsible for caries, then the balance of the microbial flora would be upset also, although such a phenomenon has not been clearly demonstrated.

CHLOROPHYLLIN DENTIFRICES

Chlorophyll, one of a group of complex plant pigments, can be mildly hydrolyzed and coverted into a residual molecule known as chlorophyllin, which is usually extracted as copper or magnesium salts. The basic chemi-

TABLE II. PENICILLIN DENTIFRICES

Investigator	Active Ingredients	Composition of Test Groups	Duration of of Test	Degree of Caries Inhibition
Zander (1950)[25]	500 units of K penicillin G/gm. tooth powder	670 children	1 to 2 years	54% reduction in caries
Hill and Kniesner (1949)[26]	1000 units penicillin/gm. tooth powder	240 boys, 8 to 15 years of age	1 year	No reduction in caries
Walsh and Smart (1951)[27]	100 units penicillin/gm. of tooth powder	Children	2½ years	No reduction in caries
Hill et al. (1953)[28]	1000 units of procaine penicillin/gm. of paste	492 children, 7 to 12 years of age	1 year	15% reduction in caries
Lunin and Mandel (1955)[29]	600 units of potassium penicillin/gm. of tooth powder	300 children	18 months	No reduction in caries

cal nucleus of chlorophyllin is similar to the nucleus of hemoglobin which is termed a "porphyrin." Early clinical studies of the water soluble products of chlorophyll indicated that they had an ability to stimulate healing under certain circumstances. Chlorophyll was also reported to function as a deodorant.

The interest in chlorophyllin as a component of therapeutic dentifrices dates from the reports of Rapp and associates in 1949[43,44] which indicated that the use of a chlorophyllin dentifrice decreased the numbers of salivary lactobacilli and was useful in treating gingivitis. Subsequent investigators[45,46] reported that chlorophyllin compounds were bactericidal for lactobacilli in vitro, but other investigations were unable to confirm Rapp's conclusion that the chlorophyllin molecule was active against lactobacilli in vivo.[47–49]

There are conflicting reports on the efficacy of chlorophyllin on experimental animal caries, although several reports indicate that copper chlorophyllin decreases the incidence of caries in Syrian hamsters.[50,51] The active principal in copper chlorophyllin seems to be free copper ions rather than the porphyrin portion of the molecule.[52]

There are no adequate clinical studies available concerning the efficacy of chlorophyllin dentifrices on human dental caries. Justification for their use is based largely on the depressing action of chlorophyllin on lactobacilli in vitro and on inhibiting the acid-producing mechanisms in saliva. Neither of these actions prove definitely the clinical usefulness of chlorophyllin dentifrices in inhibiting human caries. This question can be resolved only by adequate clinical studies.

ANTIENZYME DENTIFRICES

Antienzyme dentifrices contain an inhibitor that will interfere either directly with the early stages of the anaerobic degradation of carbohydrates or indirectly with metabolic reactions essential to but not directly a part of carbohydrate degradation, thereby preventing acid formation. In order to be useful such antienzyme inhibitors should be retained in active form at the site of carbohydrate degradation during the interim periods between application.

Inhibitors with prolonged action in the oral cavity are thought to be retained at the site of potential caries activity by forming temporary chemical or physical union with proteins of the enamel surface or dental plaque.

It is obvious that substances may be quite efficient enzyme inhibitors in vitro and yet

not be effective clinically because they are not retained at the site of caries activity for a sufficient period of time. The screening of antienzyme agents of possible use in dentifrices has been mostly by measuring their ability to inhibit acid formation in a saliva-sugar-enamel mixture and by their ability to prevent a drop in salivary acid potential below pH 5.5 in human beings even in the presence of available carbohydrate.[42] This pH is considered to be a critical one for decalcification of enamel.

Of the compounds effectively stabilizing the saliva-supar-enamel mixture, in vitro, penicillin, sodium dehydroacetate, and sodium-N-lauroyl sarcosinate have been found to prevent a drop in the salivary acid potential below pH 5.6 in man.[42,54] Clinical tests, utilizing penicillin, are described elsewhere in this article.[25–29,37,40] Limited clinical trials with sodium-N-lauroyl sarcosinate, resulted in a reduction in caries incidence of 57 percent between test and control groups.[42] The other antienzyme agents have not been subjected to adequate clinical trials and their practical usefulness is a matter of speculation.

Fluoride Dentifrices

Fluorides of various types have been administered to man in drinking water, by topical application to the enamel surface, in prophylactic pastes, and in dentifrices. For topical application, a 2 per cent, slightly acidulated solution of sodium fluoride is applied to the cleansed and dried enamel surface for usually no more than five minutes, repeating the treatment four or five times.

Two per cent sodium fluoride has been incorporated in a "polishing" paste for professional prophylaxis use by the dentist or hygienist. The abrasive in this paste is a mixture of aluminum oxide and aluminum hydroxide incorporated in a water miscible base, the principal component of which is glycerol. Laboratory tests made with this paste indicate that its application results in the retention of fluoride by enamel. Such "polishing" or prophylactic pastes have not been subjected to clinical testing, hence it is not known whether they are of any practical value.

Muhler and his associates, after considerable investigation of stannous fluoride, have found it to be suitable for incorporation in a dentifrice.[57–59] They have tested a dentifrice containing 3,200 p.p.m. stannous fluoride (1,000 p.p.m. of fluoride ions) on 6 to 15 year-old children. The use of this dentifrice for 12 months resulted in 51 per cent decrease in DMF teeth, 84 per cent reduction in proximal carious lesions, and 30 per cent reduction in occlusal carious lesions.

Discussion

Several important factors must be considered in formulating therapeutic dentifrices if they are to have any practical preventive value. A therapeutic agent will not be useful when incorporated in a dentifrice if it is unstable and quickly breaks down or reacts with any other component of the dentifrice or salivary factors in such a way as to render it inactivate.

As an example, our own investigations indicate that the fluoride in a dentifrice containing sodium fluoride, glycerine and aluminum oxide and hydroxide as an abrasive (inactive with the fluoride), is relatively inactive and does not significantly decrease the acid solubility of enamel or dentin exposed to it. (See Table III.) On the other hand, the fluoride in a dentifrice compounded of sodium fluoride and aluminum oxide and hydroxide in water is quite active and does significantly decrease the acid solubility of enamel and dentin exposed to it.

Some of the components of a dentifrice may interfere with the action of the active ingredient without actually combining with it. Although glycerine in a dentifrice is water miscible, it interferes in some way with the action of the sodium fluoride on tooth tissue. This observation is not strange if one considers that topical application of sodium fluoride is most effective if the enamel surface is thoroughly cleansed and dried before applying the fluoride solution.

TABLE III. INFLUENCE OF SODIUM AND STANNOUS FLUORIDE ON HUMAN DENTIN

Type of Treatment	Relative Inorganic+ Solubility	Relative Organic† Accessibility
Aluminum oxide* and hydroxide paste	72.3	43.7
Aluminum oxide* and hydroxide paste+20% NaF	65.9	36.8
Distilled Water	62.7	19.2
Aluminum oxide and hydroxide+2% NaF in water	6.8	47.0
Aluminum oxide and hydroxide+2% stannous fluoride in water	6.4	33.4
Aluminum oxide* and hydroxide+2% stannous fluoride+glycerine	32.7	21.2

* Contains glycerine.

+ Percentage solubility in Morse's solution (J. D. Res. *24:* 143, 1945).

† Determined according to the method of Burnett and Scherp, J. D. Res. *32:* 46–56, 1953.

It is most likely that glycerine interferes with fluoride contacting the enamel surface. Stannous fluoride is not so strongly inhibited by glycerine as is sodium fluoride. Even a stannous fluoride dentifrice containing glycerine is not nearly so effective as a similar dentifrice utilizing only water as the solvent.

There is much disagreement among both clinical and laboratory investigators as to the actual role of therapeutic dentifrices in preventive dentistry, particularly in regard to dental caries. Confusing the issue somewhat is the lack of agreement among investigators as to what influence non-therapeutic or cosmetic dentifrices have on the incidence of dental caries.

Kerr and Kesel[18] found only about 10 per cent difference in caries incidence between one group of school children using a medicated dentifrice and another group using a similar but non-medicated dentifrice. The investigations of Fosdick[60] suggest that the effectiveness of a cosmetic or non-medicated dentifrice is related to when it is used, i.e., it is most effective if used under supervision immediately after eating.

All such experiments suggest that closely supervised tooth brushing decreases caries incidence in relation to the degree of supervision employed and the time of brushing. Certainly, similar factors would seem to influence the effectiveness of a therapeutic dentifrice, unless the active agent combined with some component of the enamel surface and still retained its activity for some time after brushing.

Actually the degree of supervision employed in using most medicated and nonmedicated dentifrices may be the important if not controlling factor in its caries inhibiting efficiency. Variations in the degree of supervision employed in the various investigations could account for much of the lack of agreement as to the efficacy of therapeutic agents. This certainly seems to be the situation with the penicillin studies for this agent was generally effective in the supervised studies and not effective in the unsupervised studies.[61] It must be realized also, that even if a therapeutic agent is only slightly effective in a carefully controlled and supervised study, it is likely to be not at all effective when employed under uncontrolled conditions.

The practical effectiveness of either a therapeutic or nontherapeutic dentifrice in caries control is dependent to a considerable degree on the whims of the individual utilizing it unless the active agent is retained near the site of caries activity in the interim periods between tooth brushing. Therefore, the data concerning caries control by a therapeutic dentifrice which is obtained by carefully controlled and supervised studies cannot predict its practical usefulness under ordinary conditions.

In controlling periodontitis and gingivitis, the cleansing action of a dentifrice would seem to be a very important factor, although beneficial results have been attributed also to stimulation of the peripheral circulation

and increased keratinization. There are few experimental data available at the present time to indicate that any therapeutic agent now incorporated in dentifrices, acting alone, will control or even favorably influence periodontal disease.

References

[1] Therapeutic Dentifrices: Panel Discussion. J.A.D.A. 48:1-32, 1954.

[2] Nikiforuk, G., and MacDonald, J. B.: An Evaluation of Dentifrices in the Prevention of Dental Caries and Gingivitis. Part I. Oral Hygiene, Ammonium and Urea Compounds, and Penicillin. J. Canad. D. A., 21:557-565, 1955.

[3] MacDonald, J. B., and Nikiforuk, G.: An Evaluation of Dentifrices in the Prevention of Dental Caries and Gingivitis. Part II. Chlorophyllin, Fluorides "Anti-Enzymes." J. Canad. D. A. 21:609-616, 1955.

[4] Taylor, J. M., Greeley, H., Merritt, A. H., Hyatt, T. P., Limerick, O. V., Stillman, P. R., Buckley, J. P., and Carney, M. F.: Highfalutin Dupery. J. D. Res 1:497-506, 1919.

[5] Gies, W. J.: Pepsodent. J. D. Res. 1:507-508, 1919.

[6] Franke, Elizabeth C., and Gies, W. J.: Experimental Studies of the Validity of Advertised Claims for Products of Public Importance in Relation to Oral Hygiene or Dental Therapeutics. 2. The Advertised Claim That Pepsodent, When Used As a Dentifrice, Removes Mucin Plaques from teeth, by Digesting Such Plaques is Wholly Unwarranted. J. D. Res. 1:511-513, 1919.

[7] Gies, W.: Experimental Studies of the Validity of Advertised Claims for Products of Public Importance in Relation to Oral Hygiene or Dental Therapeutics. 4. Pepsodent "Bulletin No. 4" Does Not Show That Pepsodent Exerts Appreciable Digestive Action on Dental Mucin Plaques. J. D. Res. 2:299-312, 1920.

[8] Gies, W.: Experimental Studies of the Validity of Advertised Claims for Products of Public Importance in Relation to Oral Hygiene or Dental Therapeutics. 5. May the Use of Pebco Tooth Paste, Twice a Day, Be Reasonably Regarded As a Part of "The Basis of Correct Oral Hygiene"? J. D. Res. 2:313-324, 1920.

[9] Lowy, A.: A Medicated Tooth Paste with a Full Statement of its Composition. J. D. Res. 2:565-566, 1920.

[10] Grove, C. J., and Grove, C. T.: Chemical Study of Human Saliva Indicating That Ammonia is an Immunizing Factor in Dental Caries. J.A.D.A. 22: 247, 1935.

[11] Wach, E. C., O'Donnell, J. F., and Hine, M. K.: Effect of a Mouth Rinse on Oral Acidogenic Bacteria. J.A.D.A. 29:61, 1942.

[12] Stephan, R. M.: The Effect of Urea in Counteracting the Influence of Carbohydrates on the pH of Dental Plaques. J. D. Res. 22:63, 1943.

[13] Muntz, J. A., and Miller, B. F.: Factors Influencing Penetration of Synthetic Detergents and Certain Other Compounds into Dental Plaque Materials. J. D. Res. 22:73, 1943.

[14] Stephan, R. M., and Miller, B. F.: Effectiveness of Urea and of Synthetic Detergents in Reducing Activity of Human Dental Caries: Proc. Soc. Exper. Biol. and Med. 55:101, 1944.

[15] Kesel, R. G., O'Donnell, J. F., Kirch, E. R., and Wach, E. C.: The Biological Production and Therapeutic Use of Ammonia in the Oral Cavity in Relation to Dental Caries Prevention. J.A.D.A. 33:695, 1946.

[16] Kesel, R. G., O'Donnell, J. F., Kirch, E. R., and Wach, E. C.: The Amino Acids and their Deaminating Systems Present in Human Saliva. Am. J. Orthod. and Oral Surg. 33:68, 1947.

[17] Kesel, R. G., Nach, E. C., O'Donnell, J. F., and Kirch, E. R.: Recent Developments in Biologic Production of Ammonia and the Use of Ammonia and Carbamide in Caries Prevention. Oral Surg., Oral Med., and Oral Path. 2:459, 1949.

[18] Kerr, D. W., and Kesel, R. G.: Two Year Caries Control Study Utilizing Oral Hygiene and an Ammoniated Dentifrice. J.A.D.A. 42:180, 1951.

[19] Davies, G. N., and King, R. M.: Effectiveness of an Ammonium Ion Tooth Powder in the Control of Dental Caries. J. D. Res. 30:645, 1951.

[20] Dirks, O. B., Winkler, K. C., and Van Aken, J.: Reproducible Method for Caries Evaluation III. Test in a Therapeutic Experiment with an Ammoniated Dentifrice. J. D. Res. 32:18, 1953.

[21] Henschel, C. J., and Lieber, L.: Caries Incident Reduction by Unsupervised Use of 27.5 Percent Ammonium Therapy Dentifrice. J. D. Res. 28:248, 1949.

[22] Lefkowitz, W., and Vente, V. A:. A Preliminary Clinical Report on Caries Control with a High Urea Ammoniated Dentifrice. Oral Surg., Oral Med., and Oral Path. 4:1576, 1951.

[23] Hawes, R. R., and Bibby, B. G.: Evaluation of a Dentifrice Containing Carbamide and Urease. J.A.D.A. 46:280, 1953.

[24] Cohen, A., and Donzanti, A.: Two Year Clinical Study of Caries Control with High Urea Ammoniated Dentifrice. J.A.D.A. 49:185, 1954.

[25] Zander, H. A.: Effect of a Penicillin Dentifrice on Caries Incidence in School Children. J.A.D.A. 40:569, 1950.

[26] Hill, T. J. and Kniesner, A. H.: Penicillin Dentifrice and Dental Caries Experience in Children. J. D. Res. 28:263, 1949.

[27] Walsh, J. P., and Smart, R. S.: Clinical Trial

of a Penicillin Tooth Powder. New Zealand D. J. 47:118, 1951.

[28] Hill, T. J., Sims, J., and Newman, Millicent: Effect of Penicillin Dentifrice on Control of Dental Caries. J. D. Res. 32:448, 1953.

[29] Lunin, M., and Mandel, I. D.: Clinical Evaluation of a Penicillin Dentifrice. J.A.D.A. 51:696, 1955.

[30] Zander, H. A., and Bibby, B. G.: Laboratory and Animal Studies on the Effect of Penicillin on Caries Activity. J. D. Res. 26:454, 1947.

[31] Zander, H. A., and Bibby, B. G.: Penicillin and Caries Activity. J. D. Res. 26:365, 1947.

[32] Zander, H. A., Lisanti, V. F., and Shiere, F. R.: The Validity of Hamster Studies in Caries Control. J. D. Res. 30:139, 1951.

[33] McClure, F. J., and Hewitt, W. L. The Relation of Penicillin to Induced Rat Dental Caries and Oral L. Acidophilus. J. D. Res. 25:441, 1947.

[34] Webman, H., Hill, T. J., and Kniesner, A. H.: The Effect of Penicillin on Dental Caries in Rats Fed on a Coarse Corn Diet. J. D. Res. 28:258, 1949.

[35] Stephan, R. M., Fitzgerald, R. J. McClure, F. J., Harris, M. R., and Jordan, H.: The Comparative Effect of Penicillin, Bacitracin, Chloromycetin, Aureomycin and Streptomycin on Experimental Dental Caries and on Certain Oral Bacteria in the Rat. J. D. Res. 31:421, 1952.

[36] Webman, H., Kniesner, A. H., and Hill, T. J.: Effect of Penicillin on Incidence of Dental Caries in Rates Fed on Coarse Corn. J. D. Res. 26:455, 1947.

[37] White, B. J., Kniesner, A. H., and Hill, T. J.: Effect of Small Amounts of Penicillin on the Oral Bacterial Flora. J. D. Res. 28:267, 1949.

[38] Fosdick, L. S., Ludwick, W. E., and Schantz, C. W.: Effect of Dentifrices on Lactobacillus Counts: Antibiotics and Enzyme Inhibitors. J.A.D.A. 43:285, 1951.

[39] Carter, W. J., White, W. L., and Bass, K.: Effectiveness of Oral and Peroral Penicillin on Oral Lactobacilli in Human Beings. Oral Surg., Oral Med., and Oral Path. 6:1239, 1953.

[40] Fitzgerald, R. J., Zander, H. A., and Jordan, H. V.: Effects of a Penicillin Dentifrice on Oral Lactobacilli. J.A.D.A. 41:62, 1950.

[41] Ludwick, W. E., Bass, K. and Jay, P.: Evaluation of Antibiotic Agents in the Control of Lactobacillus Counts. J.A.D.A. 46:174, 1953.

[42] Fosdick, L. S., Calandra, J. C., Blackwell, R. Q., and Burrill, J. H.: New Approach to the Problem of Dental Caries Control. J. D. Res. 32:486, 1953.

[43] Rapp, G. W.: Chlorophyll: The Green Wonder Drug. Ill. Dent. J. 18:405, 1949.

[44] Rapp, G. W., and Olen, A. A.: The Effect of Water Soluble Chlorophyll. J. D. Res. 28:633, 1949.

[45] Bibby, B. G., and Nevin, T. A.: Effect of Water Soluble Chlorophyll on Pure Cultures of Organisms Commonly Found in Oral Cavity. J. D. Res. 30:469, 1951.

[46] McBride, W. D.: Preliminary Report on the Mechanism of Action of Porphyrin Compounds on Lactobacilli. J. D. Res. 31:486, 1952.

[47] Hein, J. W.: Mechanism of Action of Caries. Preventive Agents Affecting the Oral Environment. J. All-India D. A. 24:1, 1952.

[48] Costich, E. R., and Hein, J. W.: Clinical Study of the Effects of a Tooth Paste Containing Copper Chlorophyllin on Oral Bacteria and Gingival Disease. J. D. Res. 31:474, 1952.

[49] Kutscher, A. H. and Chilton, N. W.: Observations on the Use of a Chlorophyll Dentifrice. J.A.D.A. 46:420, 1953.

[50] Shaw, J. H.: Ineffectiveness of Sodium Copper Chlorophyllin in Prevention of Experimental Dental Caries. New York D. J. 16:503, 1950.

[51] Hein, J. W., and Shafer, W. G.: Chlorophyll as a Potential Caries Preventive Agent. Pennsylvania D. J. 16:221, 1949.

[52] Hein, J. W.: Effect of Copper Sulphate on Initiation and Progression of Dental Caries in the Syrian Hamster. J. D. Res. 32:654, 1953.

[53] McDonnell, C. H., and Domalakes, E. F.: The Effect of Toothbrushing with Dentifrices Containing Chlorophyllin on Gingivitis. J. Periodont. 23:219, 1952.

[54] Brudervold, F., and Little, Marguerite F.: Effect of Certain Antienzymes on Acid Production in Plaque. J. D. Res. 33:703, 1954.

[55] Hill, T. J.: The Use of Penicillin in Dental Caries Control. J. D. Res. 27:259, 1948.

[56] Hill, T. J., and Kniesner, A. H.: Effect of Penicillin Dentifrice on Oral Lactobacilli Counts. J. D. Res. 26:454, 1947.

[57] Muhler, J. C.: Importance of Type of Diet During the Suckling Period on the Incidence of Experimental Dental Caries in Rats. J. D. Res. 33: 245, 1954.

[58] Muhler, J. C., Radike, A. H., Nebergall, W. H., and Day, H. G.: Effect of Stannous Fluoride-Containing Dentifrice on Caries Reduction in Children. J. D. Res. 33:606, 1954.

[59] Muhler, J. C., Radike, A. W., Nebergall, W. H., and Day, H. G.: Effect of Stannous Fluoride-Containing Dentifrice on Caries Reduction in Children II. Caries Experience After One Year. J.A.D.A. 48:163, 1955.

[60] Fosdick, L. S.: Reduction of the Incidence of Dental Caries I. Immediate Tooth Brushing with a Neutral Dentifrice. J.A.D.A. 40: 133, 1950.

[61] Zander, H. A.: Antibiotics in Dentifrices. J.A.D.A. 48:3-7, 1954.

A Report on the Observation and Surgical Treatment of Two Cardiac Casualties in the Vietnam War

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IN MODERN warfare, because of high velocity projectiles and increased frequency of multiple-type injuries, the number of cardiac casualties arriving at receiving centers for definitive surgery has diminished considerably.

At one of our General Surgical Centers immediate surgical intervention, following prompt diagnosis, permitted us to save the lives of two soldiers each of whom suffered a penetrating wound of the heart by mortar fragments. We wish to present these two cases and discuss the problems encountered.

CASE ONE

21-year old Mr. Phan-Dinn-C . . . was injured at 1800 on 29 April, 1955. At 2000 he reached our service in a rather hopeless condition. The diagnosis was: Wound of the Thorax and Shock. He remained almost lifeless on the stretcher, was pale, very cyanotic, sweating profusely, and dyspneic. He was unable to respond to questioning. Examination revealed a small wound, the size of the head of a match, in the third interspace near the left sternal border. The apical impulse could not be palpated. Auscultation revealed faint heart sounds and normal respiratory sounds. Peripheral signs of shock were imperceptible radial pulse and absence of any measurable arterial pressure. No other injury was found. Considering the dramatic clinical picture and the finding of only a small single wound the location of which was most suggestive, we established the diagnosis of cardiac wound. Because of the patient's critical condition we abstained from radiological examination and a test puncture. The emergency operation began at 2030 under pentothal anesthesia with additional use of gas and oxygen.

Surgical Report. The author with one assistant and an anesthetist performed the operation. Pre-operative diagnosis was: Heart wound. In addition to cyanosis and the findings of shock the only other evidence noted was the punctiform parasternal wound in the left third interspace. The incision made was in the shape of a hinged window flap according to Delorme and Fontan. The pericardial sac was filled with blood but the pleural cavity was clear.

The pericardial sac was opened by means of a longitudinal incision. Evacuation of the dark clotted blood was then accomplished, after which blood could be seen spurting from the heart wall at the upper portion of the left ventricle (Fig. 1). The left index finger was applied gently and used as an obturator against the perforation which could be palpated as a round hole through the wall thickness which was approximately 3-4 mm. and having a diameter of about 5 mm. The

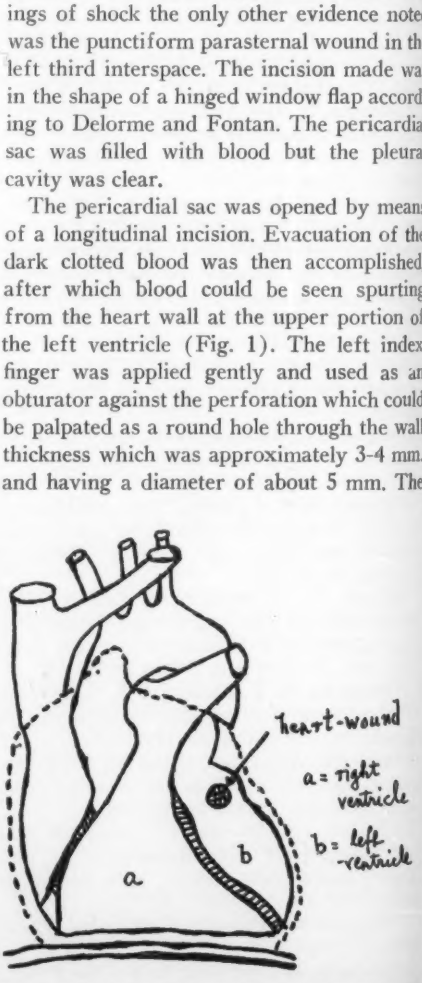

FIG. 1. Site of wound of left ventricle—Case 1.

perforation was closed by crossed No. 2 catgut sutures. The patient's general condition improved in a spectacularly rapid manner. The pulse was now palpable, respirations deepened and the cyanosis quickly changed to a normal hue. The pericardium was closed with catgut sutures. An opening was left in the lower end for drainage of the pericardial cavity. The rib window flap was then sutured, layer upon layer, with catgut and linen. A tight dressing was applied about the body. After operation the patient was placed in a position of semi-recumbancy. During and following the operation patient received 400 cc. of whole blood and 500 cc. of plasma.

Postoperative care included: (a) half-sitting position, (b) continuous O_2 therapy, (c) observation of the snug bandage, (d) 500,000 μ penicillin daily for seven days. The patient's post-operative condition remained good. He remained afebrile, breathing was normal and color remained normal. X-rays taken six days after operation showed absence of any metallic fragment, slight hypertrophy of the heart, elevation of the left diaphragm, and absence of any exudate in left pleural cavity. On the 12th post-operative day the patient's general condition was excellent, the wound was well healed with only a small cutaneous opening remaining at the lower angle of the rib window.

Electrocardiogram as described by Lt. Col. P. Caubet of Grall Hospital gave the following information, *4 June 1955:* EKG reveals regular sinus rhythm at 80 beats per minute, no axis deviation, the P-waves were flattened, PR internal normal at 0.16 sec., QRS complex widened to 0.14, which meant the presence of an atypical bundle branch block, with S1 and S2 thickened and widened.

The QRS deflection in lead 1 is opposite to that in lead 3, T1 and T3 are opposite in direction to the major QRS deflections in their respective leads.

Conclusion: EKG revealed a conductive disorder of the incomplete right bundle branch block type without actual ventricular hypertrophy or preponderance. *24 June 1955:* With reference to the previous tracing there was (1) persistence of the right bundle branch block, (2) left axis deviation, (3) R3 and T3 were inverted. This was a sign indicating a trend toward ultimate left ventricular hypertrophy. *11 July 1955:* There was no change in the tracings of 25 June. Findings indicated right bundle branch block with left ventricular hypertrophy.

Case Two

24-year old Thach-Pr... was wounded at 1800 on 12 April 1955. He arrived at our center at 1900 with a diagnosis of thoracic injury. He was lying calmly on the litter but his respirations were short and rapid. He complained of being very thirsty. The most striking sign was cyanosis of his lips and toes. Examination revealed a small linear wound with ragged edges, 3 mm. in length, situated just above the 4th rib adjacent to the left sternal border. The pulse was irregular, uneven and rapid, at times feeble, at times fairly strong. The area of the heart impulse was greatly enlarged. Heart sounds were faint. The blood pressure was 80/60. We concluded that a heart wound was the most probable diagnosis, as there was no other visible evidence of injury on the patient's body. Radiography revealed to us a typical image of hemopericardium. Immediate operation was decided upon rather than carry out any more examinations.

Surgical Report. The author with the aid of one assistant and an anesthetist proceeded to operate. Pentothal anesthesia was employed augmented by N_2O and O_2. There was found a heart wound caused by a small fragment of a mortar shell the point of entry of which was found at the level of the left fourth chondrosternal articulation. The pericardial sac, bearing out the radioscopic evidence, was full of blood. The patient was now cyanosed and in shock. The sac was opened by means of a longitudinal incision. The dark red, coagulated blood was removed. The heart wall was penetrated by a projectile at the level of the right ventricle to a length of 7 mm. One could observe blood spurting from the wound. This was closed with a

criss-cross pattern of linen sutures (Fig. 2). Closure of the pericardial sac was then accomplished leaving a small opening at the lower angle for pericardio-pleural drainage. The rib window was sutured completely with catgut and linen, layer upon layer. Pressure bandage by means of adhesive plaster was then applied. 500 cc. of preserved whole blood was given during and subsequent to the operation.

Post-operative care included: (a) half-sitting position of the patient, (b) continuous oxygen therapy, (c) resuscitation as required, (d) 1,000,000 units of penicillin daily, (e) morphine 0.01 gram, ouabaine 0.00025 gram. The post-operative course was very stormy. The patient remained very dyspneic. His pulse was rapid and irregular. The blood pressure was labile falling repeatedly to a low of 60/50. Continuous efforts were made to maintain the systolic BP at 90 to 100 mm. During the first three days the temperature remained especially high, up to 40.6C. (105F.). On the third day cold therapy (hibernation) was started and instead of penicillin we gave one gram of streptomycin and one gram of terramycin. The patient's general condition started to improve.

On the fifth post-operative day, following radioscopy, the left pleural cavity was tapped and 800 cc. of sero-sanguinous fluid drawn off. The patient appeared definitely relieved and started to breathe more normally. On the 13th day a second tap was done after x-ray study and 500 cc. of light pink fluid was obtained. On 18 May there was still evidence of exudate in the left base with a secondary pleurisy. On 22 May 1955 a third pleural tap produced nothing.

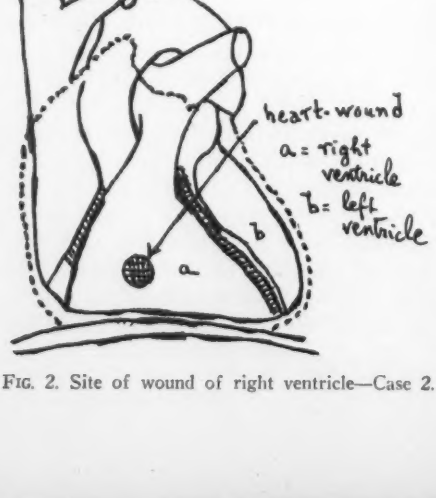

FIG. 2. Site of wound of right ventricle—Case 2.

The electrocardiogram made on 27 May 1955 by Lt. Col. Caubet, showed normal tracings. There was regular sinus rhythm. There was no evidence of abnormality of the conduction mechanism nor findings of myocardial abnormality. The PR interval was normal.

The patient was discharged on 14 June 1955 but was seen again on 11 July. At this time he complained of precordial pain and vertigo. Physical examination showed his general condition to be good and the wound had healed well by primary union. The heart sounds were normal. The electrocardiogram revealed a notched QRS complex in lead 3 and other findings indicated no changes of any importance when compared with previous tracings. The EKG was apparently normal. Some pericardial adhesions present were probably the cause of the precordial pain.

CLINICAL REMARKS

Heart wounds may present many types of clinical syndromes. Consideration will be given here only to the "surgical forms," i.e., those demanding emergency treatment. The case history, if this can be elicited, will accurately establish the nature of the wounding agent, also the hour of injury. If the injured is in a state of anxiety or shock and unable to respond this cannot be accomplished with accuracy.

On the contrary, the clinical examination is of considerable importance. Taking precautions, the injured is examined in a semi-recumbent position. The site of the wound is the essential clue—it is usually in the area of the cardiac outline; sometimes, however, it may be some distance from it. The appearance of the wound is very innocent, hardly

any bleeding noted, and all this in sharp contrast to the clinical signs which indicate the gravity of the situation. Two clinical syndromes are possible, occurring either independently or together, to one degree or another:

1) Heart wound with hemothorax: This in itself is a type of massive internal hemorrhage. There is a heart injury in addition to a pleuropulmonary wound. The diagnosis is difficult but it may be borne out with the help of radioscopy and a test puncture of the pericardial sac.

2) Hemopericardium: This type was encountered in the two above cases. The patient is frequently covered with perspiration. His lips, ears, fingers, and toes are cyanotic. This is more marked when the patient is in the supine position. Air hunger and thirst are marked. These increase the patients anxiety and excitability. Precordial palpation reveals no apical beat. Percussion of heart outline is most difficult but radiography advantageously determined this. Auscultation reveals a weakening or complete absence of heart sounds. The pulse is very rapid, weak and at times imperceptible, irregular, arrythmical, and labile—a pathognomonic factor.

The blood pressure is very low or unobtainable. In the absence of pneumo- and hemothorax the following signs may lead to an accurate diagnosis—a very small puncture wound in the precordial or surrounding area, disappearance of apical beat, weakening of heart sounds, all these plus the accompanying extremely serious clinical findings of cyanosis, air-hunger, thirst, weak, irregular pulse and low blood pressure. There are very few other findings necessary to determine the acute need for surgical intervention.

Radiological Examination. While preparing the patient for surgery the clinical examination may be augmented by radiological study with portable equipment used in the operating room. In the presence of hemopericardium the cardiac shadow is enlarged, immobile, with clear lung fields. The seeming disappearance of heart contractions is a more valuable finding, this being the only sure sign. This condition is distinguished from hemomediastinum by the triangular shape of the heart shadow and the absence of the cardio-phrenic sinus. In hemopericardium associated with left hemothorax the pericardial shadow is continuous with that of the pleural exudate creating one homogeneous pleuropericardial shadow. Also noted is the absence of the heart beat at the right cardio-pericardial contour. All in all, however, the more significant radiological finding is the immobility rather than the enlargement of the pericardial shadow.

Tapping has two purposes: (1) It will help prove the diagnosis in atypical cases. Error in technique may, however, cause blood to be drawn from the pleural sac or the heart cavities; (2) It may relieve compression on the heart. Operation is more effective since tapping does not remove the coagulated blood. Hence, the two cases described were not tapped. Only when in doubt and the patient's condition permits would it be justifiable to subject a casualty of this nature to a period of observation pending the evolution of more significant symptoms.

Treatment

DON'T—

Transfuse blood in large quantities;

Tap the pericardial sac and wait to determine whether this procedure relieves the patient to any extent. Though this measure has been staunchly recommended by the classical authors, it is a waste of time and may lead to the loss of a patient. In other words, in cases of hemopericardium once the contained blood has coagulated, at least in ventricular wounds, it cannot be removed by tapping;

Move the patient any distance even for x-raying.

DO—

Place the patient in a half-sitting position,

Give oxygen therapy,

Give morphine intravenously,

Insert two intravenous cannulae through which blood may be given slowly, (after the heart is sutured the rate of flow may be increased).

Perform an emergency operation. This intervention is necessary in all cases whether hopelessly serious or seemingly slight.

CARDIORRHAPHY

DON'T—

Operate under local anesthesia nor under general unless the intratracheal tube is employed;

Make too small an incision for fear of doing damage to the pleura;

Increase the size of the perforation by inserting the finger;

Try to search for the projectile;

Insert sutures into the apex of the left ventricle for traction;

Displace heart from it's normal position unless absolutely necessary;

Be too precise regarding needles and suture material. The needles with linen thread used in intestinal surgery and the fine needle of Reverdin with silk and catgut were used and in both instances results were perfectly satisfactory.

DO—

Use closed-chamber anesthesia with pressure.

Make an incision which will give you a wide approach. This may be a window-shaped flap according to Delorme and Fontan as employed in the above cases. It can be done quickly and does not require the extensive use of retractors. This approach may be old-fashioned but to us it proved better than other approaches for saving the patient's life. Wilm's approach requires resection of the 4th rib. It is also possible to perform an anterior thoracotomy in the left 4th interspace, cutting the chondrosternal cartilages above and below this space. A retractor would secure the necessary opening. Open the pericardium wide along its main axis. Use the index finger as a temporary plug by pressing it gently against the perforation but not forcing it into the opening. Initial transfusing should be carried cautiously and slowly, but the rate can be increased after closure of the wound. When suturing the pericardium leave an opening at its lower angle for drainage of the pericardio-pleural space. The pleura and chest wall are closed tightly and without drainage. A pressure bandage is applied in place of the classical bandage which has a tendency to hinder the normal excursions of the thorax. Other measures employed are antibiotherapy, oxygen therapy, semi-recumbent position. Complications should be guarded against and watched for (hemothorax and sometimes hemopericardium). Post operative radiography is most helpful in detecting these.

This surgical technique used for closure of cardiac injuries is comparatively simple and, without exception, it can be performed at all modern surgical installations where a closed-chamber anesthetic apparatus and an aspirator are available.

Cold Weather Test of the Evacuation Bag

By

THOMAS R. A. DAVIS, M.D. AND FRANKLIN T. ELKINS

(With two illustrations)

THE efficiency of cold weather protective equipment depends on its ability to maintain, within tolerable limits, the thermal balance of the user. This efficiency can be measured under laboratory conditions and its *clo* value determined. However, the ultimate test of such equipment is its performance in the field where its practical application can be determined, and where unforeseen factors may influence its effectiveness. This performance can be tested subjectively by obtaining the opinions of those using the equipment in the field and objectively by measuring the response of the user and determining his ability to maintain thermal balance. There is little need to point out that the first method has limitations because of dependency on subjective responses obtained often under a variety of unknown conditions and human activity. The second method produces objective results; but is there a simple method for determining thermal balance in the field?

It has been shown[1, 2, 3, 4, 5] that if mean body temperature and weight are known a close approximation of total body heat content can be determined. Changes in body heat content are direct reflections of the changes in thermal balance due to exposure to conditions which are not thermoneutral. Such changes are due to imbalance between heat production and heat loss. The body heat content at any time indicates the net result of this imbalance.

This report describes a single test of the casualty evacuation bag in the field using the methods available when the opportunity presented itself. It is felt that the results obtained during this single test are valid enough for the drawing of conclusions and for presenting a simple testing method for consideration in protective equipment testing.

The evacuation bag was developed by the Army to meet the problem of moving casualties to treatment stations. The bag is made of feathers and down and is approximately two inches in thickness and has a *clo* value of six *clo*. It has one zipper which extends along the bottom, up one side, and across half of the top; another zipper completes the closing of the top. There is a fur-edged flap continuous with the underside of the bag which forms a parka-like hood when the zippers are fully drawn to close the bag. To complete the bag there is a waterproof plastic inside liner with a zipper along one side. This plastic liner is designed to be placed inside the feathers and down bag to protect it from blood, etc. There was no outside windproof or waterproof covering. The dimensions of the bag are such that it is roomy.

In Operation Moosehorn the bag was being used for its designed purpose of keeping casualties warm during transit. Since the H13 helicopter proved to be the most reliable over-snow vehicle during the operation, the bag was being used on the outrigger platforms (designed for this purpose) of the helicopter in temperatures as low as −40°F. The bag was apparently serving its purpose, but the observation of the arrival of a chilled casualty to the station, and the claim that the patient was warm prior to the twenty-minute flight, made it imperative that tests be carried out on the bag to determine its protective properties during and immediately after flight.

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Methods

The bag was brought into a warm room at 26°C. from a helicopter and warmed. In order to allow adequate warming the bag was opened. While cold, it was found that the inside plastic liner was stiff, brittle, difficult to unzip, and a tear occurred during the unzipping procedure.

A young healthy, adult male volunteered as the subject. The subject was dressed as follows:

Pile cap
Cotton T-shirt
Cotton shorts
Two-piece Air Force fatigues
Air Force parka
One pair wool socks

This clothing has less insulating value than that normally worn by combat troops in the Arctic. But the results are considered sufficiently valid to be acceptable as an indication of the protective properties of the evacuation bag when used in the manner described.

Thermocouples of a Leeds and Northrup battery-operated flight test potentiometer were distributed in the following manner:

Lead	*Area*
1	R. foot
2	R. knee
3	R. thigh (ventral aspect)
4	R. abdomen (lower quadrant)
5	R. chest (front 4th intercostal)
6	R. forearm (lateral aspect)
7	R. hand
8	R. cheek
9	Forehead
10	Inside of liner at foot
11	Inside of liner halfway up
12	Inside of liner at top
13	Inside of bag halfway up
14	Outside of inside liner halfway up
15	Ambient air temperature
16	Rectal (10 cms insertion)

All attachments to the skin were made with skin tape, and the subject was placed in the bag which was zippered completely. First readings were made with a room temperature of 26°C. The subject was then littered to the helicopter some twenty-five yards away and fastened to the carrying platform. A plastic hood was placed over the head and shoulders. The portable potentiometer was placed in the cockpit of the helicopter on the knees of the observer and readings were continued. A flight of thirty-five minutes was made with an average speed of sixty knots and an altitude of 200-300 feet. Unfortunately, the plastic hood covered Lead 15 and true ambient air temperature during flight could not be obtained. The ambient air temperature at ground level was, however, −26°C (−14°F). After the flight of thirty-five minutes, subject complained of cold in hands and feet. The test was completed with the helicopter idling on the ground for another twelve minutes at the end of which time, the subject in the bag and on the litter was moved back to the warm room. Tests were continued for another thirty minutes in an environmental temperature of 26°C with bag closed and then opened.

Results

Figure 1 shows the results of the more important readings made. Since some of the areas recorded parallel temperature changes,

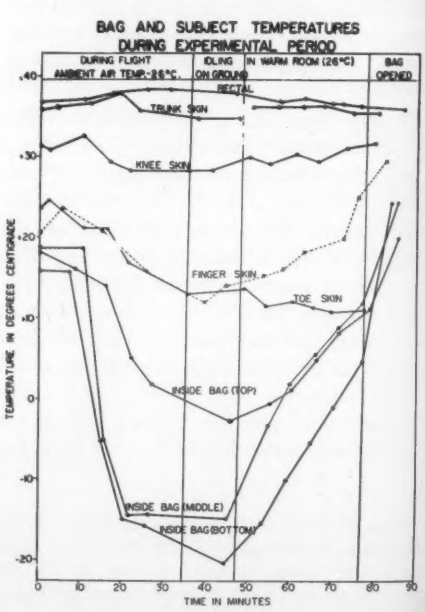

FIG. 1

these were excluded from the graph. The results charted were chosen to be representative of central temperature, trunk skin temperature, intermediate peripheral skin temperature (knee), and peripheral skin temperature as indicative of the subject's response. The results chosen to be indicative of the insulating properties of the bag were those obtained from the thermocouples attached to the inside surface of the inside liner next to the subject.

The curves plotted in the graph show that the rectal temperature (thermocouple inserted 10 cms) rose during the exposure period but fell during the rewarming period. This is the expected response of a homeotherm and occurs consistently both in man and homeothermic animals during short acute exposure to cold. It can be seen that the trunk skin, knee skin, and foot and hand temperatures all show a seemingly compensatory rise followed by a fall; the trunk skin temperature reaches a peak later than the hand and foot temperatures. The fall in peripheral temperatures (hand and foot), occurred to a greater extent than either the knee skin or the trunk skin temperatures. It can also be observed that the hand skin temperature returned to a higher temperature, whereas the foot skin temperature continued to fall.

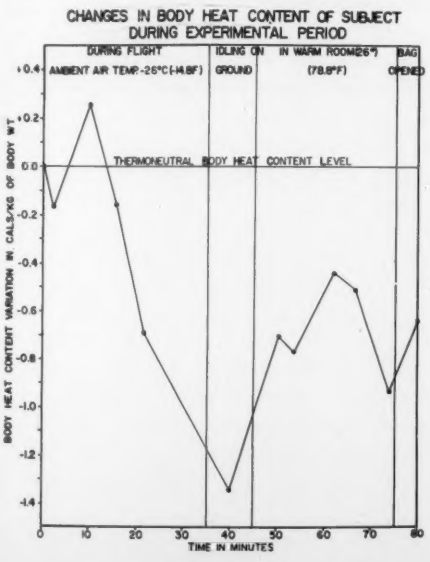

FIG. 2

The bag temperatures at the middle and at the bottom both fell steeply to low temperatures during exposure and rose almost as quickly after the cold exposure. The bag temperature at the top fell more gradually and did not reach as low a temperature. As expected, there was a sudden rise of bag temperatures when the bag was opened.

A perusal of the temperatures during the period of idling on the ground shows that all of the temperatures recorded started to return to pre-exposure levels. All temperatures continued to return to pre-exposure levels except that of the foot which continued to fall.

Figure 2 shows the variations of body heat content during the experimental period. The figures for these were obtained by applying the formulae

1) Caloric variation $= \frac{\Delta BHC,^1\ BHC^{2,3,4,---}}{M}$

Per kilogram of body weight

Where

BHC^1 = Initial body heat content of subject

$BHC^{2,3,4,---}$ = Body heat content at subsequent points during the period of experimentation

M = Weight of subject in kilograms

2) Body heat content at any one time is obtained by the formula

$BHC = M \times (.4t_S + .6t_R) \times .83$ (3, 4, 5, 6)

Where

M = Weight of subject in kilograms

t_S — Average skin temperature in °C

t_R = Rectal temperature in °C

.83 = Specific heat of living tissue

T_S is obtained by taking the average readings of thermocouples in an area and adjusting this to the percentage of this area as compared to total skin area. Thus, the average skin temperature of an area is adjusted according to the following:

Foot	=	7 percent of total skin area
Lower leg	=	13 percent of total skin area
Upper leg	=	19 percent of total skin area
Trunk	=	35 percent of total skin area
Arm	=	14 percent of total skin area
Hand	=	5 percent of total skin area
Head	=	7 percent of total skin area

The sum of these adjusted skin temperatures is a close approximation of true average skin temperature (t_s).[1,2]

The curve in Figure 2 shows that there is an initial fall in body heat content followed by a seemingly compensatory rise. After this compensatory rise, there is a rapid loss of body heat content which apparently starts to recover during the period of idling on the ground. During the period in the warm room with the bag closed and immediately after the bag is opened, there is no recovery of body heat content to the pre-exposure level. The experimental period was not continued long enough to determine the time necessary for body heat content to return to preexposure levels.

Discussion

The dramatic fall of temperature in the inside surface of the inside liner of the bag strongly suggests that the evacuation bag is unsuitable for use of evacuation of casualties in the arctic cold in the manner described. Pods have been designed to cover these bags in cold weather but were not being used because of the complaints of claustrophobic patients and the general objection that they looked like coffins. These pods are also designed so that they can be heated, but it was stated that the heating arrangements (heat from the engine) were insufficient to overcome the cold encountered in the Arctic winter and modifications would have to be made. Because the H13 proved itself to be the most suitable and reliable over-snow vehicle during the maneuvers (even at temperatures below −30°F), any modification thought necessary to keep this mode of transportation in operation would seem justifiable.

The fact that the bag temperature near the top did not fall as low as that of the middle and the bottom could be ascribed to protection from wind chill by the plastic canopy which covered this area, or to thermal exchange from the shoulder mass of the volunteer's body. However, the thermocouple at the middle of the bag was in an area equally influenced by a similar mass, namely the pelvic region. This, together with the rise of all temperatures during the period of idling on the ground, would strongly suggest that the cooling was due mainly to wind chill. If this were true, then protection by windproof material on the outside of the bag would greatly improve its cold weather properties. The continued fall of foot temperatures was probably due to thermal exchange from the foot to the large cold mass of the bag in this region.

The results depicted in Figure 2 further emphasized the unsuitability of the bag, used as described, in the cold of the Arctic and subarctic. The rapid loss of body heat content after the initial rise, together with an apparent rise during the period of idling on the ground, would seem to further support the contention that wind chill played an important role in the cooling that occurred. The inability of the body heat content to recover during the period in the warm room indicates that the body heat was perhaps being used to assist in the warming up of the interior of the evacuation bag. The lowest figure that the body heat content fell to was 1.34 calories per kilogram of body weight below normal. It is generally conceded that when body heat content falls to 3.0 calories/kg of body weight below normal, dangerous levels of negative heat balance are being reached.[1] The fall of 1.34 calories per kilogram of body weight occurred in a normal healthy subject unhampered by frank or incipient shock as a result of injury.

The use of the pod canopy with heating would probably overcome most of the shortcomings of the bag in the Arctic. The decision for the use of the pod in the cold must be made with regard to the psychological objections against it. However, until something better is devised, the matter rests on the simple decision between a casualty arriving in good physical condition or arriving in poor condition because of concession to objections which are unlikely to cause an average male adult serious psychological trauma.

These tests were carried out in moderate subzero weather with a healthy, young, male

adult volunteer. Even so, the volunteer was somewhat debilitated for a day or so after his ordeal. It is not difficult to imagine the results on a casualty who is injured, or in a state of shock, or damp from his own blood in similar circumstances to those encountered during the test. Therefore, it is essential that necessary modifications and further cold weather tests be carried out with a view to obtaining adequate protection for casualties transported in the manner described.

The results of this experiment do not in any way present methods or data which are not already well-known to workers in cold physiology. It does, however, show that simple physiological methods and tools can be applied to the objective evaluation of environmental protection equipment to test the theory by which such equipment was developed.

Summary and Conclusions

Tests using methods for determining thermal balance were carried out on the currently used evacuation bag. The results show that, without further protection, this piece of equipment, used in the manner described, is unsuitable for transporting casualties on the H13 helicopter in the arctic and subarctic cold. Further tests and modifications are planned for the future.

References

[1] Hardy, J. D., and DuBois, E. F.: Basal metabolism, radiation, convection and evaporization, at temperatures of 22° to 35° C. J. Nutrition, *15*:477, 1938.

[2] DuBois, D., and DuBois, E. F.: The measurement of the surface area of man. Arch. Int. Med., *15*:868, 1915.

[3] Burton, A. C.: The average temperature of the tissues of the body. J. Nutrition, *9*:261, 1935.

[4] Bazett, H. C., and McClone, B.: Temperature gradients in the tissues of man. Am. J. Physiol., *82*:415, 1927.

[5] Braune, W., and Fischer, O.: Determination of the moment of inertia of the human body and the limbs. S. Hirse Z, Leipzig, 1892.

[6] Pembrey, M. S.: "Animal heat" in "Textbook of Physiology." E. A. Schafer, Vol. 1:838, Hodder and Stoughton, London, 1898.

Gen. Elec. Research Lab.

Dr. Wm. J. Farrell (left), Ellis Hospital, Schenectady, N.Y. is shown placing a plastic bag which contains a frozen blood vessel beneath the nozzle of an electron beam generator. At the right are General Electric Research Laboratory scientists, Dr. Willem F. Westendorp and Elliott J. Lawton, The beam of electrons sterilizes the blood vessel before storage in the "blood vessel bank."

Our Military Postures*

By

ADMIRAL ARTHUR RADFORD

Chairman, Joint Chiefs of Staff, Washington, D.C.

I AM HONORED to have this opportunity to address the Association of Military Surgeons at your 63rd Annual Convention. I know personally of your great interest in national defense, and your fine devotion to our national well-being. I am confident that you understand many of the operations of the Department of Defense, and that you are ever mindful of our defense requirements.

In these important times, our operations and requirements have affected, and have been affected by, the tremendous advances in the sciences including those in the field of medicine. Many of these advances of the past decade are now impersonal, established facts—facts which have their effects on the free and the just, and the fettered and the unjust, with equal force.

These scientific advances require us, as professional military men, not only to be aware of their existence, but also to be aware of their beneficial and their destructive potentials.

In fact, we must selectively explore to the maximum, both their beneficial and destructive potentials, in order to be sure that we maintain the lean, hard-muscled and efficient military strength we need to implement national policy.

With this in mind, perhaps I can best contribute to your Convention if I discuss briefly: First, the vitally important military posture of the United States; and second, the equally important military posture of the individual.

It is my feeling that you gentlemen are very much involved with both postures. As members of this Association, you are uniquely qualified to understand their importance; and what's more, to do something about them. It should be your particular interest to keep fat from depositing in the brain or the muscle of either military posture. Flabbiness on either a national or an individual scale could adversely affect the implementation of our country's objectives.

Navy Photo

ADMIRAL ARTHUR RADFORD

I. NATIONAL POSTURE

Now, you and I know that the clear-cut objective of our national defense policy is to preserve the security of the United States and its fundamental institutions.

The primary threat to that objective consists of the policies and the power of the Soviet Communist Bloc, complete with its ideology and its international apparatus. Thus, the big problem we face is how best to meet this threat to our security without

* Presented at the International Luncheon, 63rd Annual Convention, Association of Military Surgeons of the United States, Hotel Statler, Washington, D.C., November 13, 1956.

undermining our fundamental values and institutions.

Although the core of Communist power is, of course, its armed strength, particularly the growing Soviet nuclear power and improved delivery systems, the threat is not solely military.

The threat actually consists of clever and insidious combinations of military, political, psychological, and economic lines of action. It is any one of these elements, and it is also any combination of them. Communists have intensified today's conflict to a high degree by varying and combining different lines of action—often behind a facade of smiles.

As far as I can observe, there has been no change in the basic fundamental Communist objective of one Big Red World. We have seen no change in Soviet heart. We have only seen changes in Communist tactics—changes usually made in accordance with the degree of resistance to Communist expansion.

Recently, the pressures and the will of the peoples in Poland and Hungary for a greater degree of national independence have become more insistent. The events there have been dramatic, and they warrant our serious concern. We still cannot tell with absolute certainty what all these events portend.

It is quite obvious, however, that the Soviet Communists have had several major problems confronting them. For years, they have been doing a cover-up job, hiding their internal difficulties with peoples they have suppressed. And now they are no longer able to hide the hope that these down-trodden people have for Freedom.

For a moment, the Soviets sought to salvage that situation by means other than force. What they offered, however, was no real solution—but then, I am not at all sure that they ever really want a solution.

Too often, it seems that the Communists use poverty, turmoil, dissension, and military force to serve their admitted aims. Subversion, treachery, sabotage and the enormous lie are actually their preferred—and too often their most effective—weapons.

Such weapons deflect the vector of world peace, and keep the situation dangerous. Their effect is to undermine the chances of genuine security. Certainly we cannot be indifferent to their continuation without endangering everything we hold dear.

These are some of the many reasons why it is incumbent upon us as a nation to maintain every phase of our strength. With conditions around the world as they are today, our country has no sane alternative. We need to preserve a strong military posture on a long-term basis.

Specifically, we must continue a very patient and long-range program, taking advantage of every technological advance which will contribute to increasing the effectiveness of our strength.

We also must insist that the defense of our country is the privilege as well as the duty of every American. Our country did this when our hospitals had no antibiotics, and the main medical instrument was the surgeon's saw. We must still do so. It is implicit in our philosophy of individual dignity and Freedom.

Now, what degree of military strength we need is a matter of careful, calculated judgment. It is not an exact science.

We recognize that while our military strength must be powerful, it must not be excessive to a degree that could seriously impair the economic vigor of our country. While it must be qualitatively superior, it must be selective of that which is needed, as compared to that which would be "nice to have." And, while it must be adequate, it must not exceed the will and the ability of the American people to support it over a long period of time.

As of this moment, I can report to your Association that this country of yours and mine—the United States—does have strong defenses. We have military forces numbering about 2,800,000 men. These men are equipped with the most modern weapons, superbly led, and in a high state of readiness. We have an Armed Forces Team with a counteroffensive capability not only to deter war, but to win one if one is forced upon us.

II. Individual

In achieving the balance between adequate military strength and a tolerable burden on the nation's economy, the vigor and the efficiency of each individual involved in the Defense effort become of greater and greater importance. The sturdy, erect individual in the military service—one who is well balanced and alert, physically and mentally—has long been the symbol of our military effectiveness.

Now, I do not believe in radical extirpation of fat from a military person by some sudden administrative decree or mandate, for too often this blunt scalpel removes needed muscle or brain tissue to the detriment of the individual and the surgeon alike.

Rather, I prefer to practice preventive medicine, whereby through the good use of military exercise and hygiene, we trade large flabby muscles for somewhat smaller, more sinewy muscles which are more capable of meeting the immediate and the sustained demands of our world-wide commitments.

This means two things. It means that the individual soldier, sailor, airman and marine should be more expert in preventive medicine, and it also means that we must have the very best of professional medical care.

In speaking of preventive medicine, I use the term in its broad sense, for it is my feeling that preventive medicine can no longer be limited to the problems of simply preventing the transmission of disease. Instead, each individual must have an understanding of the personal preventive medicine of building his own physical strength, stamina, and resistance to disease.

From where I sit as a member of the Joint Chiefs of Staff, I sometimes wonder about this aspect of our preventive medicine. I wonder if we are adequately stressing the appropriate principles of personal and individual health.

Today's health problems reflect, in part at least, the tensions of our times, and the more rapid pace at which we seem to live.

Does the individual officer in some key position of responsibility have a reasonable medical understanding of the "why" in heart disease? Does he know how he might minimize some of the causes of this serious disability? And is he aware of the serious physical detriments involved in obesity?

Then take our young military specialists—our jet pilots, submariners, guided missile experts, and the like—do you think that they really understand the dynamic forces of nuclear power, supersonic speeds, toxic chemical fumes, electricity, and high altitudes? Do they know the different forces which can surge through their bodies, and what their different effects will be?

Gentlemen: It is extremely important in my judgment that our military men know more of the principles of individual preventive physiology. I should like every officer and enlisted man to be thoroughly schooled in the fundamentals of daily health. Each one should achieve the measure of mental and physical condition that insures alertness and guarantees stamina.

The stamina I seek is both the stamina one needs for all-out combat over long periods of time and the stamina one needs to cope with protracted periods of mental effort and great tension.

Part of it is, as I say, individual preventive medicine; but there is also one other part I would like you to consider in your Convention meetings, and that is the very best of professional medical care. By medical care, I mean that our medical and surgical services must not break down at any point in our many operations, climates, or environments.

You know, of course, about the Armed Forces' great need for career doctors. We need doctors dedicated to the military profession. We need surgeons and dentists and nurses and medical specialists. When I speak of these needs, I speak for all the Armed Forces, their dependents, and all the civilian employees overseas who support our Armed Forces. It seems to me that, with the help of organizations like yours, the prospects for solving our shortages should be brighter.

III. Concluding Remarks

In closing, I would like to emphasize and recommend your considered interest in both aspects of our military posture—individual and national.

There probably is no way of estimating here today what all the demands of the future will mean to you in the medical profession. That the demands will be heavy is obvious—if we are to maintain a rate of progress second to none, and keep our military postures in their most effective state. The more effectively you support the fighting forces, the more men there will be to man their duty posts—and the fewer patients we will have in our military hospitals.

We do not seek strong military postures because war is inevitable. We are building strength because the facts of life in the world about us have clearly shown that military weakness cannot provide security.

Until the society of nations produces a tested vaccine for the plague of war, we have no recourse but to maintain strength—strength which in turn is derived from a healthy nation. Disraeli once said—"The health of the people is really the foundation upon which all their happiness and all their powers as a State depends."

That strength can be the tower of hope and confidence for other Free nations, as we all band together in the common effort to preserve the ideals and principles for which we stand.

SUPPORT THE RED CROSS

Brig. Gen. Edward J. Kendricks (MC): Military Surgeon

By
MAE MILLS LINK, PH.D.
Senior Medical Historian, United States Air Force

So passed a Commandant who was a professional soldier and airman, imbued with a firm belief in military honor and decorum, as well as a capable and humane physician. . . . He was proud of the uniform he wore, and dedicated to the highest ideals of the healing art.[1]

U. S. Air Force Photo

BRIG. GEN. EDWARD J. KENDRICKS, USAF (MC)

THOSE were the words in which the history of the USAF School of Aviation Medicine appraised the qualities of the late Brig. Gen. Edward J. Kendricks, USAF (MC), Commandant of the School from 1953 to 1956. One of the senior officers in the United States Air Force Medical Service, General Kendricks was a figure known throughout the medical world. A balding man of medium height and courtly bearing, his most outstanding physical feature was his eyes—penetrating blue behind rimless glasses. In them was kindness, so that his visage—otherwise stern—reflected a disciplined strength softened by great humaneness. He was the "doc" on the flight line, obviously interested in the crewman; the counsellor in his office to whom his professional colleague could turn. His sudden death of a heart attack on 17 February 1956 shocked the entire circle of the military medical profession.

Destiny provides few medical officers with the opportunities that befell General Kendricks. Certainly no medical officer ever bore with more dignity the responsibilities that went with such opportunities. Each opportunity in turn was nurtured by the soundness and breadth of his medical training and philosophy. His concepts of military medicine were built upon a foundation of professional knowledge and had been validated at the scene of battle. His application of the traditional principles of "field medicine" to the peculiar needs of the Air Force was unparalleled by that of any other Army Air Force medical officer in World War II. For it was in his Command—the Ninth Air Force—as in no other that the "field medicine" of the ground forces and the "aviation medicine" of the Air Forces were wedded to meet the needs of a tactical Air Force whose primary mission was to provide ground support.

Born in 1899, he attended the University of Michigan and the Northwestern University School of Medicine. In October 1930 he entered the Army Medical Corps as a First Lieutenant. During the next few years he served as ward officer at Selfridge Field, Michigan; as assistant to the Flight Surgeon at Fort Leavenworth, Kansas; and as Chief of the Surgical Services at Fort Monmouth, New Jersey. This broad experience in general medicine was followed by postgraduate courses at the Army Medical Field Service School at Carlisle Barracks, Pennsylvania, and the Walter Reed Army Medical Center, Washington, D.C. In August 1934 after serving as Surgeon of the U. S. Army Transport, *Republic,* he entered the

School of Aviation Medicine at Randolph Field for training as a Flight Surgeon. Upon graduation he served successively until 1937 as attending surgeon, group surgeon, and wing surgeon at Langley Field, Virginia. At that time he returned to the School of Aviation Medicine as head of the Department of Neuropsychiatry. Shortly after the United States entered World War II, Lieutenant Colonel Kendricks was called to the Office of the Air Surgeon in Washington, D.C.

In May 1942 he was appointed Surgeon of the famed 376th Bombardment Group, better known as the "Halverson Detachment."[2] Trained in great secrecy, this combat group was to have bombed Tokyo from the mainland of Asia. Instead, when it reached Cairo, Egypt, en route to Burma, it was diverted to the defense of North Africa where Rommel's Armies were rapidly advancing. During the first troubled days in Egypt, the Halverson Detachment was the only AAF combat unit in that theater although within a few weeks it was joined by the handful of men and planes of the Brereton Detachment brought hastily from India by Maj. Gen. (later Lt. Gen.) Louis Brereton. When the Ninth Air Force, under Brereton, was organized,[3] Kendricks, a Colonel, became Surgeon. He held this position through the next three years as the Ninth moved up the "underbelly" toward the Rhineland.

Though pitifully small, the early combat efforts of the Halverson Detachment were designed to stop the drive on Suez. With few combat crews and extremely limited numbers of planes the problems of aviation medicine centered largely around the maintenance of combat effectiveness. The desert itself seemed sometimes to be as formidable an enemy as the armies of Rommel. There were the hot winds. Men living in tents had no way to stave off the sands that smothered them, that lodged in their food. Rations at best were unpalatable. With no sanitary conveniences whatsoever, there were outbreaks of dysentery. Morale was low because there had been no letters from home in the long weeks past, nor were there such items as cigarettes or cold drinks or any of the small luxuries which could do so much to boost a man's morale. These were all field problems of medical significance.

As Surgeon, Colonel Kendricks was faced with other problems of field medicine that were unique in the annals of American military medicine. He was dependent indirectly upon the British for hospital facilities, and sometimes the air evacuation lines were long. Later the 315th Troop Carrier Group evacuated the sick and wounded to the 38th General Hospital in Heliopolis, Egypt, from the areas of Sfax, Zarvia and Tripoli in Southern Tunisia, and Bengasi. The sick and wounded were also moved by ambulance and hospital train to the 113th General Hospital in Ahwaz and evacuated by air to Egypt. Patients from Massawa and Miahabar who had traveled by diesel car to Gura were also evacuated from that point by air to Egypt. Brig. Gen. Crawford Sams (MC), Surgeon for the Middle East Forces of which the Ninth for a time was part, wrote:

> It was during the development of the air evacuation system in the Middle East that the necessity for medical holding units at airfields was apparent. They were used so far as I know for the first time in that area. Originally, modified platoons of field hospitals were found to be a satisfactory type of unit for this purpose.[4]

It was in this geographical area, too, that another development took place. According to General Sams, ". . . so far as I know the first time a hospital was moved by aircraft was in the Middle East in the invasion of Sicily when we stripped down one platoon of the 4th Field Hospital, flew it into Malta where it was staged preparatory to being flown into Sicily. . . ."[5]

In the fall of 1943 the Ninth moved to England preparatory to the cross-Channel attack. There it found its mission more complex and projected in size on a scale more massive than any other air force in history. In October 1943 Brereton wrote from Sunningham, new Headquarters for the Ninth:

> This air force differs materially in its composition from the Eighth Air Force. Its mission is to cooperate with and support the action of the field

armies. It is the air striking force at the disposal of the ground commander. It will eliminate the enemy air threat to our armies; will isolate the combat areas by destroying reinforcements and communications, and by direct action on the battlefield. . . .[6]

To carry out this mission the strength of the Ninth Air Force was to stand at roughly 185,000. The health of the Command was a direct responsibility of Colonel Kendricks. The traditional difficulties of field medicine were compounded by the fact that prior to the Normandy Invasion the Ninth was also called upon to participate in long-range high-altitude bombings, which entailed a host of new problems.

During the Landings on 6 June 1944 the field experience gained was on a massive scale. All units had complete T/BA equipment, and personnel immunizations were complete. Equipment for each medical battalion included 4 kits, medical parachutist; 2 medical haversacks; and expendables. The 3d Platoon, 40th Field Hospital, which had been dispatched on 2 June as an Advance Section, was to cover the crash strip for returning aircraft. The mission was "to set up an advance section of the 3d Platoon, to give definite treatment to patients of the Ninth Air Force who were unable to reach their bases due to wounds caused by enemy action on D-Day."[7] The first casualties were received on Wednesday, 7 June 1944.

Through the next weeks the Medical Service of the Ninth Air Force won high accolade from General Brereton. On 10 July 1944 (D plus 34) he wrote from Normandy:

> . . . I flew to advance hqs. in Normandy and, with . . . Col. Edward J. Kendricks, chief surgeon, Ninth Air Force, inspected four Air Force hospitals. All were in superior condition, clean, well organized and well administered. Fortunately for us, the clearing stations have operated at only 20-percent capacity. Orders were given to transfer the personnel to the Ground Forces where they were needed. At one clearing station the Regimental Commander [*sic*] was doing an emergency operation for appendicitis while at another a young soldier was brought who had been blinded by the explosion of a land mine.[8]

As the Allied Campaigns pushed into the Rhineland and Central Europe, Colonel Kendricks continued to provide a flexible and highly mobile medical service for this great tactical air arm. When, after the surrender of Germany, he returned home in July 1945, he had been decorated with the Soldiers' Medal for Valor, the Bronze Star, the French Legion of Honor, and the Croix de Guerre with palms of Belgium, France and Luxembourg.

Home again, he could turn his attention once more to his primary interest, aviation medicine. For a few months he served as Command Surgeon of the Army Air Force Personnel Distribution Center in Louisville, Kentucky, but in May 1946 he was appointed Chief of the Aeromedical Laboratory at Wright-Patterson Air Force Base in Dayton, Ohio. This peacetime mission through the next three years brought him into the center of pure research. To his assignment he brought firsthand medical experience from the greatest testing ground of high-altitude high-speed flight.

Promoted to the rank of brigadier general, Kendricks in 1949 entered a new phase of his professional career. On 1 July the United States Air Force Medical Service was established with Maj. Gen. Malcolm C. Grow as first Surgeon General. General Kendricks was appointed his Director of Staffing and Education.[9] In this position he was to be faced with many types of problems that taxed his professional ingenuity. If the new Medical Service were to be effective, physicians and other Medical Service personnel had to be recruited. This was no small task in view of the fact that there was a continuing nation-wide shortage of most personnel categories, particularly physicians, dentists, and nurses. To build a solid core of career officers, it was necessary to provide career incentives.

For this difficult assignment General Kendricks was particularly well suited because he himself reflected the best qualities of a military medical officer. Professionally mature both as an officer and as a physician, he had by now run the gamut of combat experience from the hot sands of desert war-

fare to the frigid no-man's land of aerial warfare over Western Europe. In the prewar period he had gained professional experience that provided a special application of his clinical knowledge of neuropsychiatry to the specialized problems of aviation medicine; in the postwar period he had directed the highly technical aspects of aeromedical research.

Added to this wealth of background was his sense of dedication to the military organization. Again and again his colleagues heard him reiterate at Command Surgeons' Conferences and among other comparable groups that he personally was proud to be a military physician. When the going sometimes got rough and the military medical services sought to match the medical career incentives by making them more and more like those of the civilian world, he would have none of it. It was his contention that a military career was attractive in itself; that it offered advantages not found in the civilian profession; that rather than having the ranks thrown open to every candidate, it should be an honor to the candidate to be chosen for service. For General Kendricks the degree of honor and pride that a career officer should feel when he had been accepted into the military service was not measurable in dollar units. Indeed, without a deep sensitivity to the intangible values involved and without an awareness of his deep responsibility to his military service, a young doctor, he felt, had no place in the group. If he were merely peddling his profession to the highest bidder, he should go to the open market place.

It was a fitting honor that General Kendricks was selected in 1951 to deliver the Kober Lecture, the first medical officer of the United States Air Force to be chosen for this high honor. "Aviation medicine," he stressed as he had through the years, was the "field medicine" of the Air Force. In field medicine the physician could not function apart from the combat team he served: medicine became the handmaiden. According to General Kendricks, "From the date that the military physician became interested in matters other than wounds, he became a member of the combat team."

In May 1953 General Kendricks went back to his beloved School of Aviation Medicine as Commandant. His two predecessors in the postwar period, Maj. Gen. Harry G. Armstrong and Maj. Gen. Otis O. Benson, Jr., had brought new stature to the School, especially in the field of research. Under their administrations, plans had gone forward for the building of an Aeromedical Research Center at Brooks Air Force Base.

When General Kendricks became Commandant he brought not only the knowledge, experience and keen interest in research developed during his assignment at the Aeromedical Laboratory, but also the balancing knowledge of clinical medicine. According to the official history of SAM:

> It had been General Kendricks' long cherished ambition to climax his career in the Medical Service as Commandant of this School. In particular, he had hoped to see the School established in its new headquarters at Brooks Air Force Base before his retirement.[10]

General Kendricks saw at Randolph Air Force Base three important elements of military medicine brought together: research, clinical medicine, and academic training.[11] While he was intensely interested in research and while he stressed again and again the importance of clinical medicine, his major emphasis in this period of his career was upon the educational activities of the School and the need to raise academic standards. Major changes in policies and methods, however, had been postponed until the transfer to the more modern facilities at Brooks—facilities, which the SAM historian notes succinctly, "General Kendricks was never to see." Nevertheless, as architect of a potential curriculum that could meet the academic requirements of the new Aeromedical Center, his influence would long be present.

In his role as Commandant, General Kendricks was able to emphasize the two basic tenets of his philosophy about the military physician. The one had to do with personal integrity, the second with professional background. He continued to vocalize his belief

that the military doctor should be proud of the uniform he wore and dedicated to the cause of which it was symbolic. There was never any doubt in anyone's mind as to how he felt on this subject. Nor was there any question as to how he felt about the qualifications of the young doctor who, in an age of specialization, could become so limited in his own specialty that he forgot the total human being upon whom he practiced his specialty. "In my opinion," he said, "a man becomes a better doctor if he spends some years in general practice before he narrows his interest to a specialty."[12]

Certainly no one man in our generation ever measured up more nearly to the high principles he held. And while the measure of a man can never be told by a single pen, the School historian has spoken well. For here indeed was a professional soldier and airman—a physician—who commanded respect and inspired affection.

REFERENCES

[1] Semi-Annual Historical Report, 1 Jan-30 Jun 1956, Vol 22, School of Aviation Medicine, USAF (Medical Service), prepared by 2d Lt. John W. Schindler, USAF, Historical Officer for Command Historian, p. 5.

[2] See Craven, W. F. and Cate, J. L., *The Army Air Forces in World War II, Vol I* (Chicago, Illinois, 1948), pp. 341-342, 493, and 510-511.

[3] See Link, M. M. and Coleman, H. A., *Medical Support of the Army Air Forces in World War II* (Washington, D.C., 1955), p. 588 ff.

[4] As cited *ibid*, p. 590

[5] *Ibid.*

[6] Brereton, Louis H., Lieutenant General, USA, *The Brereton Diaries* (New York, 1946), p. 213.

[7] Link and Coleman, op cit., p. 594.

[8] Brereton, op cit., p. 306.

[9] *First Report of the USAF Medical Service*, 1 Jul 49-30 Jun 52 (Washington, D.C., 1952), p. 92.

[10] Schindler, op. cit., pp. 1-2.

[11] Airman training is carried on at the Gunter Branch of SAM, located in Montgomery, Alabama.

[12] As cited in Editorial entitled "Specialization," in *Military Medicine* (Vol 117, No 4, October 1955), p. 379.

AERO MEDICAL ASSOCIATION MEETING

The 28th Annual Meeting of the Aero Medical Association will be held at the Shirley Savoy Hotel, Denver, Colorado, May 6-8, 1957.

Science History and Its Recent Losses

By
CLAUDIUS F. MAYER, M.D.

THE history of medicine and the history of science in general entered their period of revival after World War II. As soon as the Great War was over, the international lines of communication reopened, and scientists everywhere took hold of the new opportunities for study and exchange of ideas. Historians of science have been especially avid to regain the former high level of esteem they had acquired in the 1930-ies. Thus, many new centers were established, and new societies were created for studies in science history, and the roster of historically minded physicians and scholars began to grow all over the world.

Among the more interesting international developments on the field of medical history is the foundation of a "National Library of Medical History" (*Országos Orvostörténeti Könyvtár*) in Budapest, Hungary, in 1951. After more than a thousand years of existence, and in spite of its many losses throughout the warring centuries, Hungary still abounds in valuable relics of civilization and documents of medical culture which this unique library attempts to collect and to preserve.

Not so long ago (1955), the young Hungarian National Library of Medical History started its own printed magazine to communicate to the world the results of research carried out by the enthusiastic group of medical historians who have gathered around the new sanctuary of science. The first two issues of the new serial, which is called "*Communicationes ex Bibliotheca Historiae Medicae Hungarica*" (Az Országos Orvostörténeti Könyvtár Közleményei), show that many of the topics of the Hungarian historians of science are of general interest.

Some of the essays are about local institutions and figures, such as the hospitals of Vas County (Hahn), spas of the peasants (Vajkai), the examination of barber-surgeons in the 18th century (Jáki), the "*puteus leprosorum*" in Veszprém (Palla), or the first medical woman in Hungary (Katona). Other studies, though starting on Hungarian topics, are of wider significance, as the bibliography of Hungarian dentistry (Huszár), materialism in Hungarian medicine (Hahn), the first Hungarian balneological survey (Daday), and the dialecticism in the works of Alexander Korányi, famous Hungarian physician (Mosonyi).

A few essays are on such topics as Hippocrates and his bioclimatology (Kérdö), the use of *Juniperus* throughout the centuries (Natter-Nád), the medical letters of the Hungarian humanist Andrews Dudith in the renaissance (Berndorfer). Unfortunately, much of the valuable research is going to be lost, because, with the exception of an essay in German, the language of all communications is Hungarian, and their brief résumés in the obligatory Russian and another foreign language are not revealing anything of the great variety of details contained in each study.

One of the articles in Number 2 of the Communicationes is *an account by George Gortvay*, former head of the Hungarian National Public Health Museum in the prewar years, on the losses which the history of science suffered since 1945. His account merits a repetition in English since it gives an overall view of the progress of science history during the past decade. The next following 27 names represent Gortvay's study, with some modifications. To his list of deceased historians I attached the names of 27 other scholars in the field of science history who died in recent years.

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1. Among the medical historians who died since 1945 the best known was the Italian Arturo CASTIGLIONI (1874-1953), medical director of the Lloyd Ocean Liner Com-

pany in Trieste and professor of medical history at the University of Padova (1924). For political reasons he had to emigrate to the United States in 1938, where he acquired citizenship and, from 1943 to 1947, functioned as the professor of medical history at Yale University. In 1947 he returned to his native land, and was living in Milano until his death.

Castiglioni's first work was about the life and research of Santorio (1591-1636), physician at Padova and father of metabolology (*La vita e l'opera di Santorio Capodistriano.* Bologna, 1920). In another work (*Storia de' medici e medicine di alti tempi.* Milano, 1925) he published 17 essays related to Italian medicine.

Castiglioni's best known work is his *Storia della medicina* (1. ed., Milano, 1927) which is now available in its third Italian edition (1948). It was also translated into French, English (1. ed., N. Y., 1941; 2. ed., 1947, by Krumbhaar), Spanish, Portuguese and German. Although it is the best medical history which was published in the Italian language since the times of Salvatore De'Renzi (whose work appeared in 1844-49), and although it is of great authenticity in such fields as the medieval medicine in Italy, or the medicine of the renaissance, or the medical school of Salerno, its concentration upon biographies, discoveries and inventions and its almost complete neglect of the social and cultural relations of medicine is considered a serious defect of Castiglioni's historical textbook.

In the preface to the French edition of his history (Par., 1931), Castiglioni discussed the problem whether science historians should bother with contemporary questions. He belonged to the group of historians who believe that it is never easy (perhaps not prudent) for a historian to evaluate recent and current events. Hence, in his own historical studies, he would stop at the threshold of the current era.

A detailed list of Castiglioni's works may be found in the festschrift (*Essays in the History of Medicine*) which was published in his honor as Supplement No. 3 to the Bulletin of the History of Medicine (Balt., 1944) (Cf. also in vol. 13, 16, 27, 36, 38 of Isis).

2. Angelo BELLINI (1872-1949), dermatologist in Milano, wrote several articles on the history of prostitution. His most impressive essay remains *Girolamo Cardano e il suo tempore* (Milano, 1942), which is a study on Cardano (1501-76), Paduan medical professor who became famous in Renaissance Europe for his works on physiognomy (1550) and clinical pathology (1583). Bellini also translated into Italian and edited the autobiography of this 16th century scholar (Milano, 1932).

3. Sebastino TINIPANARO (1888-1949) was a pioneer Italian historian of science. He devoted much research to the activities of Leonardo, Galilei (*Oeuvres de Galilée,* 2 v. Milano, 1936-38), Volta, Van Marnon, etc.

4. Maxime LAIGNEL-LAVASTINE (1875-1953) was neurologist in Paris. Since 1931 he was professor of medical history at Paris, also the chairman of the International Society of Medical History. His field was the history of neurology, neurotic and psychic diseases in the Middle Ages, Jewish medicine, and medical iconography.

Among his better known lesser publications is one on the medical aspects of the Bruxelles exposition of ancient art (Aesculape, 1935, 25:266-75). His brief history of French medicine appeared as a special issue in the Clio Medica series (1934). His editorial main work is a three-volume general history of medicine, pharmacy, dentistry and the veterinary art (*Histoire générale de la médecine,* etc. Paris, 1934-49), a work richly illustrated, and therein might rest its chief value, since it is not a coherent textbook, but a series of numerous smaller studies of varying scientific value. It happens to be the largest medical history in the French language since 1870 when Daremberg had published his 2-volume textbook of medical history.

5. Lucien GUÉNOT (1866-1951), French historian of science, devoted his time chiefly to the history and philosophy of biology. His

main works are a) *L'évolutions biologiques* (Par., 1951), and b) *Invention et finalité en biologie* (Par., 1941).

6. Pierre BRUNET (1893- 30 Nov., 1950) was the founder and editor of the *Revue d'histoire des sciences,* a serial devoted to the history of science (1947—). His main work (with Aldo Mieli) is a textbook (*Histoire des sciences; Antiquités.* Par., 1935) which is an anthology of selected extracts in French translation, with commentaries. He also published a 2-volume study on the scientific activities of Maupertuis (1698-1769), French mathematician and astronomer (Par., 1929). He also wrote several articles on Agricola, Newton, etc., and a work related to the history of mechanics (Par., 1938).

7. Sergei Ivanovich VAVILOV (1891-1951) was in charge of the Soviet Physico-Optical Research Institute, professor of physics at the University of Moskva, editor-in-chief of the Great Soviet Encyclopedia, and president (since 1945)of the Soviet Academy of Sciences. He has been known for his interest in Newton, and his efforts to revive Russian history of science. He collected and edited the works of several early Russian scholars. In 1943, for the 300-year birthday anniversary of Isaac Newton (1643-1727), Vavilov republished all works of Newton in the Russian language, including the rare *Lectiones Opticae,* which, inspite of its first London edition in 1704 (!) had been unknown or almost forgotten even in England.

8. Edward Theodore WITHINGTON (1860-1947), English physician, had been a very busy medico-historical writer. Aside from his numerous smaller studies related to medieval medicine and similar topics, he will be remembered by four works: a) *Medical History from Earliest Times* (Lond., 1894), b) *The History of Greek Therapeutics, and The Malaria* (1919), c) a study (1924) on the surgical knowledge contained in the Corpus Hippocraticun, and d) his classical study (1940) on the Greek medical terminology which appeared in the Liddel-Scott Greek Dictionary.

9. James Frank COLYER (1866-1954) was an English stomatologist, who studied comparative dentistry, and was in charge of the Stomatological Division of the Hunterian Museum (now the division is called the "Colyer Museum"). In several articles he analyzed the pioneer stomatological activities of John Hunter (1728-93). Colyer's main work is a history of *"Old Instruments Used for Extracting Teeth"* (Lond., 1952). Such a history goes back to the 11th century Arabs who then taught dental surgery to such medieval surgeons as Guglielmo Di Saliceto in 13th century Bologna.

10. Cecil Clifford DOBELL (1886-1949), famous English protozoologist, and expert in tropical diseases, was a student of the history of zoology and microscopy. His essay on the life and work of Leeuwenhoek (Lond., 1932) offers many new data concerning the history of the microscope.

It has been known for some time that the first manufacturer of the compound microscope was Zaccharias Janssen, Dutch optician in 1590. Descartes made his own microscope in 1637, and Malpighi in 1667. Leeuwenhoek used an optic instrument which allowed a 300 × magnification, and thus he could see bacteria, the red blood cells, and 38 different protozoa, among them the *Giardia intestinalis* (1681) and the *Eimeria stidiae* (1683).

11. Ingjold Reichborn-KJENNERUD (1865-1949) was Norwegian military surgeon, and Surgeon General in 1930. His research included ethnography and folk medicine in Norway, and its results were published by the Norwegian Academy of Sciences between 1932 and 1947 in 5 volumes (*A Vaar gamle Trolldoms medsin*). In another work he outlined the history of medicine in Norway (*Medisinens historia i Norge;* 1936).

12. In Denmark, Johannes Trolle HJELMSLEV (1873-1950) devoted much time to the history of mathematics. He reedited (1928-31) a mathematical work of the year 1672 which was written by Georg Mohr (*the Euclid of Denmark*).

13. In Belgium, the physician René SAND

(1877-1953) was the Surgeon General of the Belgian Public Health Service (1937-51), and director of the social medical chair at the University of Bruxelles. He became famous by founding in 1929 the International Hospital League. As science historian, he produced an important work dealing with the history of the application of medical sciences in state and society (*Vers la médecine sociale.* Par., 1948) which was later translated into English (*The Advance to Social Medicine.* Lond., 1952). In 1951, Sand was awarded by the World Health Organization the Léon Bernard Prize, usually conferred upon eminent representatives of social medicine.

14. Jean Joseph TRICOT-ROYER (1875-1951), also a Belgian physician, was professor of medical history at the universities of Ghent, and Louvain. In 1920 he founded the International Society for Medical History. His most important work deals with the history of leprosy. In 1924, he also edited the *Yperman,* the journal of the Belgian Society for Medical History.

15. Howard DITTRICK (1877-1954), Cleveland physician, developed a medico-historical museum which is now called after him. Among its treasures there is a unique collection of nursing bottles. (Cf. his account in Bull. Hist. Med., 1940, 8:1214-45).

16. Victor ROBINSON (1886-1947) was professor of medical history at Temple University in Philadelphia, and editor of *Medical Life* (1926-38). He also edited the *Historia Medicinae* (1926-44), a series of unnumbered monographic studies. Robinson obtained his reputation by his medical biographies which he republished under the title *"Pathfinders of Medicine"* (N.Y., 1912).

17. Felix OEFELE (1861-1954), German medical scholar, resided in New York. He was the father of medical assyrology and egyptology. His many publications are on the medical knowledge of Babylon-Assyria and Egypt. His *Keilschriftmedizin* (Breslau, 1902) created a new branch in medical history which has undoubtedly been abandoned since his death.

18. Heinz ZEISS (1888-1945) was professor of public health at the universities of Hamburg and Berlin. In 1921-31, he was bacteriologist in Soviet Russia, and chief of the chemotherapeutic department of the Research Institute for Experimental Therapeutics headed by Tarrassevich.

His literary activity concerned topics of epidemiology, parasitology, and medical history. He created the concept of geomedicine and geopathology (rather rediscovered it). He translated into German the biography of Mechnikov (Jena, 1932), a work which was written by the widow of Mechnikov on the basis of her husband's manuscript autobiography (This work was also published in English under the title *The Life of Elia Mechnikov,* 1845-1916, Lond., 1921).

It was Zeiss who brought first news to western countries about the newly reorganized medico-historical research in Soviet Russia and about the work plan adopted by the Medico-Historical Research Institute in Moskva (Cf. Arch. Gesch. Med., 1931, 258-63). His biography of Behring (*Behrings Gestalt und Werk.* Berl., 1940) became an important source book on the heroic age of bacteriology.

19. Friedrich WOLTER (1877-1946), director of the Research Institute for Epidemiology in Hamburg, published several works related to the tasks, aims, and tendencies of epidemiological research (Hamb., 1925; Münch., 1926). He also emphasized Pettenkofer's doctrine on the role of environment in the origin of epidemics, in contrast to the concept of Koch which states that the sick man or the healthy carrier of bacteria is the only factor in the origin of epidemics.

20. Alfred SCHMID (1884-1946), urologist, was professor of medical history at the University of Bonn. His eyes searched the mysteries of the skies and the histories of astronomy and meteorology.

21. Karl SCHMIZ (1877-1946) was a privatdozent, later regular professor of medical history at Bonn. His sphere of research was limited to the 19th century.

22. Walter BRUNN (1876-1952) was the successor of Henry E. Sigerist at Leipzig (after the latter's departure to the U.S.), and director of the Karl Sudhoff Institute for Medical History. Among his works the best known is a *Brief History of Surgery* (1932).

23. For many years (1896-1934), Julius MAGYARY-KOSSA (1865-1944) was the professor of pharmacy at the Veterinary School in Budapest. His works in science history are numerous, and his publications are also important in the field of pharmacology, ethnography and linguistics. His collection of Hungarian veterinary articles was published as a significant bibliography of veterinary medicine (*Állatorvosi Könyvészet*). His chef-d'oeuvre is the Hungarian Medical Reminiscences (*Magyar orvosi emlékek*, 4. v., Budapest, 1929-40) a collective repository of valuable source material as well as of shorter and longer studies of this old master which he carried out throughout forty years of active medico-historical research. (Fortunately, a part of this work was also published in German as *Medizinische Erinnerungen* (Bp., 1935). The 3rd and 4th volumes of the work are a long assembly of "Res gestae" of Hungarian and international medical interest in chronological order from 1000 A.D. to 1800 A.D. The sources of this collection were old medical books, printed and manuscript documents, archives, biographies, serials, rare local monographs and topographies, etc.

Magyary-Kossa showed the ways and methods for the analytical historians of science. Every country has unexplored sources of historical value, and every historian is in need of works which bring up the hidden treasures of science to be found in out-of-way publications, remote archival material, hidden files of institutions, etc. Without such analytical mining work by the historians, writers of historical textbooks and monographs will be at complete loss. (He was kind to write an introduction to my first book in 1927 as the first comprehensive general medical history published in Hungary).

24. Jenö PATAKI (1857-1944) was surgeon and pediatrist, and a specialist in the medical history of Transylvania (an old part of Hungary). As the last descendant of a famous medical family, he practiced at Kolozsvár, and at the local university he held lectures in medical history. Among his larger works is a history of the medical section of a local museal association (1938), a *Medical Almanac* (1924), an account of the aims of medical research in Transylvania (1933), and a serial of medical portraits published in a local periodical (1920-30).

25. Joseph ERNYEY (1874-1945) was pharmacist in Hungary, and the first director of the Hungarian Museum for Natural Sciences (1934). His field of research was the history of pharmacology and natural science. The best known of his journal articles are those on private medical schools, on barber surgeons, sanitation of mines, ancient drug preparations in Hungary, etc.

26. Raymond RAPAICH (1884-1954) was a member of the Hungarian Academy of Sciences and chairman of its bio-medico-historical committee. Many of his works are related to plant ecology and the history of botany, such as one work on the *History of bread and food plants* (1934), *History of horticulture* (1941), *Trends in the history of botany* (1915), and a *History of biology* (1954).

27. Since his graduation day (1893) Max NEUBURGER (1868-1955) devoted himself to neurology. In 1897 he published a monograph on the developmental history of the physiology of nervous system, which was his thesis of habilitation as a privatdozent of medical history at the University of Wien. In 1904, he became extraordinary professor of the same subject, and he was promoted to ordinary professor in 1912. In 1938 Neuburger emigrated to London, and worked for a while at the Wellcome Medical Historical Museum. Later, in 1948, he went to the United States to visit his son. His last years after 1952 were spent in Wien again.

The chief products of his scientific work are a reedition of Puschmann's medico-his-

torical handbook (together with Julius Pagel: *Handbuch der Geschichte der Medizin,* 3 v. Jena, 1902-05), his own history of medicine (2 v. Stuttg., 1906-11) which ends with the account of the Middle Ages (its English translation was published in London in 2 volumes, 1910-25). He also wrote a local medical history of Austria (Wien, 1918), and an account of old medical Wien (*Das alte medizinische Wien.* Lpz., 1921). The extent of his literary activities is mentioned in three different jubilee volumes which were written in his honor at his various (60., 70., 85.) birthdays. (Cf. also E. Berghoff: Max Neuburger, Wien, 1948).

Let's now recall the memories of other science historians of recent years not mentioned in Gortvay's account.

28. Sydney H. BALL (1877-1949) was an American geologist and historian of precious stones. His *Roman Book on Precious Stones* (Los Ang., 1950) included also an English modernization of the 37th book of Pliny. The first accurate topographic map of Death Valley in S. E. California was also produced by Ball.

29. Harry FRIEDENWALD (1864-1950) was an ophthalmologist in Baltimore, and a historian of Jewish medicine. His main works are: a) *The Jews and Medicine* (2 v., 1944), and b) *Jewish Luminaries in Medical History,* which was also a catalogue raisonné of his own library (Balt., 1946). I have also known him as a collector of rare books and incunabula.

30. Mikami KOSHIO (1875-1950) was Japanese historian of mathematics. He published many books and memoirs in Japanese. Several of his works appeared also in foreign languages, as a book on the development of mathematics in China and Japan (Lpz., 1913), and a *History of Japanese Mathematics* (Chic., 1914). At the end of his life he retreated to a Buddhist monastery.

31. Mary Acworth EVERSHED [née ORR] (1867-1949) was outstanding in the history of astronomy. She worked with her husband as an astronomer in Madras Province, India (1906-23). She wrote a book on *Dante and The Early Astronomers* (Lond., 1914), and founded the historical section of the British Astronomical Association (1930).

32. Jan Christiaan SMUTS (1870-1950), soldier, statesman, philosopher, and man of science in the South African Republic, will be remembered by his philosophical works, especially by *Holism and Evolution* (1926) and his other holistic essays.

33. Henry Winram DICKINSON (1870-1952) was English historian of technology, and a member of the staff of the South Kensington Science Museum (1895-1930). He was among the charter members of the Newcomen Society in 1920. His publications are related to history of technology, to the works of Watt, Halliwell, Trevithick, Boulton, the steam engine, etc.

34. DU'O'NG - BA - BANH (1920-51) was a physician in Vietnam where he practiced obstetrics. He wrote a work on the *History of medicine in Vietnam* (Hanoi, 1947-50). On his way to a gynecological congress in Nice he died accidentally.

35. Eduardo GARCIA DE ZÚNIGA (d. 1951) was historian of science, mathematician and humanist in Uruguay. He developed the very rich mathematical library at Montevideo University. Among his studies there is one on commercial arithmetics, on Leibniz, Newton, etc.

36. Edgar Erskine HUME (1889-1952) was Major General in the U. S. Medical Corps of the Army, and an ardent student of medico-historical topics. Among his best studies are his work on the Knight Hospitallers (1940), on *Ornithologists in the U. S. Army Medical Corps* (1942) and his book entitled *"Victories of Army Medicine."* When he was about to retire from his military carrier (1951) he was the Chief Surgeon of the Far Eastern Command.

37. Sir Charles SHERRINGTON (1858-1952) was best known as an outstanding neurophysiologist. His main work was on the integrative action of the nervous system

(1906). Among his historical writings the most important is *"The Endeavour of Jean Fernel"* (1946).

38. Gino TESTI (1892-1951) was an Italian chemist and science historian. He wrote an alchemical dictionary on historical basis (Roma, 1950), and was the co-editor of the memoirs of the Italian Institute for the History of Chemistry (1937-38—).

39. Joseph WALSH (1870-1946) was a physician and historian of medicine, and practiced as a tuberculosis specialist in Philadelphia. He wrote many books and articles on tuberculosis, and was one of the founders of the Henry Phipps Institute of his city, and of the sanatorium at White Haven. He wrote a biography of Galen (1934-39). His brother, James Joseph Walsh (1865-1942) was also a historian of medicine, and a prolific writer. The brother's History of Medicine in New York (5 v., 1919) and his Medieval Medicine (1920) are of great reference value.

40. Max MEYERHOF (1874-1945) was a German ophthalmologist who emigrated to Egypt. His literary activity includes professional papers on eye diseases, and excellent studies on Arab medicine. His numerous publications are listed in my article on Arabism, Egypt and Max Meyerhof (see Bull. Hist. Med., 1946, 19:375-432). He wrote several articles on Maimonides, and on the eye surgery of the medieval Arabs. Many of his studies deal with the tradition of classical antiquity as it was transmitted through the Arab translators of the Middle Ages.

41. Everett Eugene EDWARDS (1900-1952) was American historian of agriculture. He was one of the founders of the Agricultural History Society and the editor of the review called *Agricultural History* (1927-).

42. Tadeusz ESTREICHER (1871-1952) was Polish chemist and historian of science. His monograph on the *Jagellonian Globe* (Krakow, 1900) is his main work. A history of Polish chemistry written by him remained incomplete.

43. Federigo ENRIQUES (1871-1946) was a distinguished mathematician and founder of the Institute for the History and Philosophy of Science at the University of Rome. He wrote a compendium of the history of scientific thought (*Compendio di storia del pensiero scientifico,* Bologna, 1937), and a larger work on the same subject (Milano, 1932). Being a historian of logic, he paid special attention to mathematical ideas (*Per la storia della logica,* etc. Bologna, 1922; also French, English and German translations).

44. Petre SERGESCU (1893-1954) was a Romanian mathematician who resided in France, and was active in the work of the International Society for the History of Science. His main work was devoted to 20th century mathematics in France (*Les sciences mathématiques.* Par., 1933). A few years ago he was president of the International Society.

45. Henri DAUDIN (1881-1947) was historian of the natural sciences in France. His main work in 3 volumes is a classical study of the period of the great classifiers, Linné, Jussieu, Cuvier and Lamarck (*Études d'histoire des sciences naturelles. Par.,* 1926).

46. Sir Percy Molesworth SYKES (1867-1945) was a historian of geography. His main work is the *History of Exploration* (1. ed., Lond., 1934; 3. ed. N.Y., 1950) from the earliest times to the present day.

47. Sir William Napier SHAW (1854-1945) left the world a *Manual of Meteorology* (1926) whose first volume is devoted to the history of this science. It was reedited in 1932, and reprinted in 1942.

48. Solomon GANDZ (1884-1954) was born in Austria where he completed his rabbinical training. Then, he emigrated to the United States where he was associated with the New York Theological Seminary of Yeshiva University, and was also professor of the history of Semitic civilization at Dropsie College. His many works are related to the historical interpretation of the Talmud and the science history of the Bible, of Baby-

lon, and Egypt. He was also interested in the history of mathematics. (For his works see Isis, 1955, 46: pt. 2, 107-10).

49. Henry CREW (1859-1953) was a distinguished teacher of physics in the United States. He was the author of one of the standard histories of physics (*The Rise of Modern Physics.* Balt., 1928; 2. ed., 1935). His translation of Galileo's Two New Sciences is one of the most widely read and reprinted scientific classic (N.Y., 1914; reissued in 1933, 1939, 1946, 1952). His translation of a work of Francesco Maurolycus (*Photismi de lumine.* N.Y., 1940) is important for the medieval history of optics. (For a short bibliography see Isis, 1954, 45:169-74).

50. Aldo MIELI (1879-1950) was a great Italian historian of science who peregrinated from his country to Argentina where he died. He is best known as the editor and founder of the magazine *Archeion* (or *Archivio di storia delle scienze.* Roma, 1919-43). He was a great organizer, and established an Academy of Science in 1928 for the interest of science historians. He was especially interested in Arab science and its role in the scientific evolution of the world (Leiden, 1939).

51. Julius RUSKA (1867-1949) was a great historian of Arab science, especially of alchemy. He republished many original Arabic manuscripts, and he was one of the greatest science historians of our century. He was the founder and editor of several magazines of his field. First he worked in Heidelberg, later he moved to Berlin. In Heidelberg, he was the director of the Institute for History of Natural Sciences. His most valuable works were published in the *Quellen und Studien zur Geschichte der Naturwissenschaften und der Medizin,* edited by Paul Diepgen and himself. In 1928, he founded the Research Institute for History of Natural Sciences in Berlin. The leading of this institute was taken away from Ruska and transferred to Diepgen in 1929, apparently for political reasons.

52. Eric WALLER (d. 1955) was physician in Stockholm, and librarian of the Swedish Medical Society. He was an untiring collector of rare medical books and incunabula, and contributed many papers on medical history and bibliography. The catalog of his rich collection was recently published. It is a valuable reference work for the students of old medicine.

53. George SARTON (1884-1956) was a Belgian by birth. After the invasion of his country during the First World War he emigrated to the United States. Before this step, he had already made up his mind to leave his formal field of mathematics, and to devote himself to the study of science history. In 1912 he founded *Isis,* the magazine which became his mate almost until his death. Sarton's life in America is described in a jubilee volume (*Studies and Essays,* etc. N.Y.) published at his 60th birthday. He worked as a research associate of the Carnegie Institution of Washington, and was a teacher of science history at Harvard University.

His main publications are: a) *Introduction to the History of Science* (3 v. in 5, Balt., 1927-48); b) *The History of Science and the New Humanism* (N.Y., 1931); c) *Ancient Science to the Time of Epicuros* (Bost., 1952); d) *A Guide to the History of Science* (also called *Horus*) (Waltham, 1952), which is a first guide for the study of history of science and contains a large number of important bibliographies. Sarton was editor of his *Isis* (vol. 1, 1913-). He also published the annual *Osiris* (vol. 1, 1936-). The number of his lesser articles, notes and reviews is tremendous.

54. Edmund Taylor WHITTAKER (1873-1956) was not only a modern mathematical physicist, but also a masterly interpreter of the old. Already in 1910, he wrote his *History of the Theories of Aether and Electricity* (Lond., 1910). The need for a reissue of this work arose about the time when Whittaker retired from the chair of mathematics at Edinburgh University, and the revision was published in two volumes (1951-53). It is considered a work of the greatest value. His original contributions to

pure and applied mathematics are numerous. He was one of those whom scientific research converted into Roman Catholicism (1930). He was also interested in the philosophy of the Thomists, and he scrutinized the ideas of Thomas of Aquino (*Space and Spirit*, 1946). (Cf. Science, 1956, 124:208-9).

ALPHABETICAL LIST OF HISTORIANS
(Numbers refer to those in text)

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Bellini A. 2
Brunet P. 6
Brunn W. 22
Castiglioni A. 1
Colyer J. F. 9
Crew H. 49
Daudin H. 45
Dickinson H. W. 33
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EDITORIAL

Dependency and Rehabilitation

THE Federal Government plans to put into effect two programs which are aimed toward the study of poverty and dependency in the United States. The one is a research program to determine the basic causes of poverty and dependency, the other is a program to train personnel in the complex problems which constantly arise in dealing with poverty, dependency, and rehabilitation of individuals.

In our great country of surpluses it is paradoxical that there should be among us people who do not have all the necessities of life plus some of the luxuries. A study into the reasons is certainly a worth while project, not a project with a terminal date either, but rather a continuing study for all time. It is not expected that poverty and dependency will be non-existent through any study, but it is to be expected that many problems leading to such states can be solved and the lot of many people improved.

We can think of a few reasons for poverty and dependency. They are the same ones that most people think of: inability to work because of illness or injury, lack of abilities to meet the competition of life, squandering on non-essentials, and lack of ambition to be independent of others.

After the problems are determined it might be expected that solutions would be proposed. But let us not expect miracles. There are people who are perfectly content to live in squalor and in a state of dependency on others. It is the easiest way for them. To do otherwise means effort and they are not willing to put forth the effort. The energy of the workers in this field must be expended on those unfortunates who are willing to be rehabilitated and whose plight can be improved by overcoming disease, supplying proper food, and good shelter.

The desire to improve one's condition was present in one of the great Americans whose birthday we celebrate this month. Born of poor parents, he was given the spark to improve his lot through study. He was an avid reader, he loved humanity, he deplored the miseries of the human race, and wanted to do something about it. He prepared himself.

Lincoln said, "Upon the subject of education, not presuming to dictate any plan or system respecting it, I can only say that I view it as the most important subject which we, as a people, can be engaged in.

"That every man may receive at least a moderate education, and thereby be enabled to read the histories of his own and other countries, by which he may duly appreciate the value of our free institutions, appears to be an object of vital importance; even on this account alone, to say nothing of the advantages and satisfaction to be derived from all being able to read the Scriptures and other works, both of a religious and moral nature, for themselves."

Through education Lincoln overcame poverty. The desire for that education was within himself. When he became of age he "could read, write, and cipher to the rule of three, but that was all." Necessity and the desire to get ahead overcame his deficiencies.

Unless there is education of the individuals who are in the class of poverty and dependency and unless there is a willingness to accept that education the results in improving their plight will be meager.

Around the World

(Ser. II, No. 6)

By
CLAUDIUS F. MAYER, M.D.

FRANCE unveiled a *memorial to the unknown Jewish martyr*. The monument was erected in a square in the center of Paris, in memory of the six million Jews of Europe who were killed during World War II. It is built of granite and concrete; the symbolic tomb is represented by a Star of David in black marble, and the names of the concentration camps are inscribed on a great bronze urn. The tomb is in the crypt of the building the rest of which serves as the archives of the Contemporary Jewish Documentation Center of Paris.

The *1956 Nobel Prize in physiology and medicine* was given to three men whose names are related to the development of *catheterization of the heart*. In 1929 Forssmann, then a young German urologist in Berlin, opened his own left cubital vein and timidly pushed a ureteral catheter to the right atrium of the heart (65 cm distance), under the guidance of radioscopy and a mirror. In 1941, the method was proved to be completely harmless by Cournand and Richards, physicians of the Bellevue Hospital in New York. Forssmann is at present a GP, a country doctor at Bad Kreuznach, in a poor province of West Germany. The *Nobel Prize in chemistry* was divided between Sir Cyril Hinshelwood and Prof. Nikolai Semenov, for their work on the kinetics of chemical reactions. The Russian chemist is the director of the Institute of Chemical Physics in Moskva. He is the first Soviet citizen, though the fourth Russian, to receive the Nobel Prize. The other Russians, previously awarded with the prize, were Pavlov (1904), Mechnikov (1908), and the emigré Ivan Bunin (1933; literature).

June of this year will unite several international groups of *experts in Torino*, Italy. In the early part of the month, the Second *International Congress of Photobiology* will discuss in that city various topics of general biological, medical and climatological interest. About the same time, the *International Convention on Goiter* and the *Convention on Nuclear Medicine* will also congregate in the same town. The goiter experts will learn about the advances in the treatment of thyroid cancer, isolated thyroid nodules, and the therapy of endemic goiter. The attention of the nuclear physicians will be concentrated upon biological phenomena related to radiations of higher energy.

The 1957 *International Red Cross Conference* will be held in the heart of Asia, at New Delhi. One of the main items on the agenda is the rules for the protection of the civilian population from dangers of indiscriminate warfare.

Military medicine will have its 15th International Congress held in Belgrade from September 29 to October 6. One of the leading topics of this congress is the organization of medical services in motorized operations. During the congress, there will be also a symposium on hypothermia.

The most spectacular of the international congresses of this year will undoubtedly be the *HARVEY Tercentenary Congress* to be held from June 3 to June 7 at the Royal College of Surgeons, London. Harvey died 300 years ago, and the celebrations will spotlight every aspect of the blood circulation. Indeed, the Harvey Congress will be an International Congress on the Circulation. The topics include also the results of cardiac surgery, and the various facets of greater and lesser, fetal, cerebral, coronary, splanchnic and peripheral circulation (Details to be obtained from the Secretary, 11 Chandos Street, Cavendish Square, London, W.E).

Among the recent *losses of science and*

medicine we mention the famous Russian eye surgeon, Valdimir *Filatov* (1875-1956, Oct. 31) who died in Odessa. He has been best known for his success in grafting corneas, and in perfecting the work which was originally started by Hippel, of Göttingen. He had also observed that implantation of a graft tended to clear existing corneal opacities. Upon this observation he built up a now obsolescent theory of tissue-stimulation by release of "biogenic substances."

Switzerland lost Dr. Eugen *Bircher-Oehler* (1881-1956), military surgeon, former director of a hospital and member of the Swiss parliament. We also received word that Dr. Henrique da *Rocha-Lima,* noted Brazilian scientist and former professor at Hamburg University (at the Tropical Medicine Institute, 1919-1928), died (April 12, 1956) in São Paulo. He was the discoverer of the agent of louse-borne exanthematic typhus (the Rickettsia prowazeki). He collaborated with Oswaldo Crúz when the latter was named director of Public Health in Brazil. In São Paulo, Da Rocha-Lima also organized the Biological Institute.

Among the Moslems of *Morocco, cancer* is very frequent. At the Central Tumor Laboratory of the country's health service, where the cases are histologically and statistically studied, it was found that 450 cases of the 1635 cancers (79.95% of the total) observed in the Mohammedan population, were cancers of the female genital organs. Almost one half of the genital cancer material came from young women still within the reproductive range. Every year, 6 to 7 thousand new cancer cases are detected in Morocco.

Almost all inhabitants in this North African Arab country contract epidemic conjunctivitis and *trachoma in early childhood,* especially in the southern part of Morocco. First, there usually comes epidemic conjunctivitis, which occurs in seasons year after year. Eyes weakened by the yearly infection become then the hotbeds of trachoma which, once acquired, may persist throughout life. For the extermination of trachoma in Morocco, case-finding surveys are carried out at schools, and acute cases are treated. The chronic cases are watched for relapse. Until now, about a total of 130,000 children had been treated with aureomycin ointment, with complete cure in 80% of the trachoma cases.

The latest annual report of *Nigeria* tells of a former *secret society of the Yoruba tribe* which used to live on blackmail. If they were unsuccessful in their attempt, they infected with smallpox virus the household which resisted them. In their operations they used the scrapings of the skin-rash of actual smallpox cases. Sometimes, when there was not sufficient infective material, they created epidemics of smallpox. The practice of this so-called *sopono cult* was finally stopped with the aid of a great Nigerian physician and pioneer, Dr. Oguntola Sapara, who joined the cult incognito to learn the working methods of the illegal organization.

The bugaboo of rapid *increase in the world's population* is continuously haunting. In the last hundred years the population of the world more than doubled. Asia has 1,451 million, Europe 404 million, America 357 million, Africa 210 million, Oceania 14 million, and the USSR (not included in Europe and Asia) 214 million. Increase was so rapid during the past four years that every day added 100,000 mouths to feed. If the present tendency continues, by 1980 the world population will be over 3,500 million, and by 2056 A.D. it will have reached 6,000 million. Opinions greatly differ on how to deal with this problem. The general recommendations are: reduce the birth-rate, and increase the food supply.

Ceylon's population is estimated at 8,385,000 (for 1954). It increases at the rate of 2.5% annually (some 209,000 new citizens). This rate of natural increase is only exceeded by Singapore (3.8%), Venezuela (3.6%) and Malaya (3.1%). The population's density per square kilometer is about 335 persons. Throughout the past decade the expectation of the life of a Ceylonese increased from 33 to 42.8 years, i.e., almost by ten years. The birth rate of the country was 36.2 per thousand (for 1954), and it is again

exceeded only by the birth rates of the above-mentioned countries, and of Burma. The death rate in Ceylon (10.4 per thousand) was among the lowest of the South-East Asian countries. The mortality rates of infants and mothers are still higher there than in more civilized lands. Public health authorities in Ceylon consider it a major problem of the Government to plan immediately for the next six years and to provide additional employment, social services, housing, food, and recreational facilities before the end of the program period in 1959/60.

In the summer of 1955 a Swedish lady physician (Svensson) visited Nepal and West Bengal, and surveyed the inhabitants of these *Himalayan highlands* for *intestinal parasites*. Her report was recently released. Such a survey was difficult in Nepal where people would "rather die with their worms than to submit themselves to examination." The stools of over 500 persons were examined. All the common cyst-forming species of protozoa and all the common helminths were encountered. The survey showed that high altitude (above 4000 feet), especially when combined with dry and cold climate, counteracts the maturity of parasitic eggs and larvae. At *Kalimpong, the leprosy colony* had 20 Tibetan patients, but none of them was infested with helminths.

In *India,* a *Central Health Education Bureau,* with an up-to-date library and health museum, is now being constructed at New Delhi. It will be completed by the end of this year. Similar institutions are planned for other states of India. Health museums are already in existence at Hyderabad, Mysore, Baroda, and Lucknow.

A few months ago, there was a *sea-snake scare in Penang,* Malaya. Sea-snakes are the most abundant and venomous reptiles of the world. The shores of the Indian and Pacific Oceans, from the Persian Gulf to Japan, and down to the Australian tropical coasts and the southern Pacific Islands, are inhabited by the many genera and species of the sea-snake family (*Hydrophiidae*). They are recognized by their flat, oar-like tail. Their venoms are almost purely neurotoxic. Death from their bites comes with progressive paresis, dyspnea, ptosis, and paralysis of the bulbar respiratory center.

The victims of sea-snakes are mostly fishermen, rarely bathers. They are bitten because they do not see the snake. The bite does not cause any more than the initial sensation of a prick of a needle; there is no subsequent pain though the fang marks, like circular dots by hypodermic needles, are visible, especially around the ankle. Leg paresis, or ptosis will appear from one half to six hours after the bite. For treatment, doctors in Malaya now use polyvalent serum containing a *krait* fraction. There is no other specific serum available against sea-snake poisoning. It is said that there is hardly a village on the shores of the Gulf of Siam that was spared of fatalities by sea-snakes. Two bathers were fatally bitten by sea-snakes on the same afternoon in 1954 near "Lover's Isle," a famous beauty spot of Penang and a favorite bathing place.

For several months the Medical School of Tokushima University has been carrying out a research on the *noisiness of Japanese cities. Tokushima* is a city without streetcars, and its noise may be considered the minimum attainable by any city when the streetcars are removed. It was found that the noise of Tokushima is chiefly caused by motor cycles, and, in certain districts of the town, by busy traffic of cars, busses and trucks. Other sources of noise are the loudspeakers advertising various entertainments, and whistles of the steamships moving in and out in the early morning hours. An effort is now being made to keep the noise down to 45 phones around hospitals and schools. Regulations in the future should also consider the roar of airplanes. Much can undoubtedly be accomplished by adequate city-planning.

Japan's public health is now kept at a higher level, as proved by the declining death rate. Formerly, the chief cause of death among the Japanese was tuberculosis. Now, according to more recent statistics, cerebral hemorrhage is the greatest killer in Nippon

(110 per thousand of death). The average age of the Japanese has been now extended to 61.30 years for men, and to 64.67 years for women. Twenty years ago 47 and 50 years were the average life span for the sons and daughters of the Rising Sun.

The 1956 Medical Directory of *Panama* reveals that the *medical practice* of this small Central-American country is regulated by various laws such as the one on the nationalization of the medical profession (1938), others on the National Health Board (1941), on the Sanitary Code (1947), etc. Panamanian doctors form seven professional societies. There are 15 governmental hospitals, most of them founded in recent years. The oldest one, with 1010 beds, is the *Hospital Santo Thomas,* established in 1695. It has the services of 96 physicians, 186 nurses, and 105 auxiliary nurses. The monthly turnover of its dispensary is 19,000 patients. Panama also has 30 sanitary units (and "brigades"), 10 private hospitals and clinics. Moreover, there are 3 hospitals and one leprosarium at the Panama Canal Zone. The country has over 805,000 inhabitants who have their medical care from 232 Panamanian and 52 foreign physicians. The total number of all medical graduates in Panama is now 328. A great many doctors are graduates of North American universities.

Recent studies *in Peru* showed that *the man of the Andes* has a different physiology than the man of the coasts. The man of the altitude, descending to the tropical lowlands, has to conquer the climatic trauma during the period of adaptation. There is also a different psychology and a diverse social adaptation required at the coastal areas. People who recently migrated from altitude to lowland are thus suffering from a terrible physiological and *psychosomatic maladjustment.* The symptoms of this maladjustment are many, and they may produce cardiovascular failures, gastrointestinal troubles, pseudotuberculosis, rheumatic pains, and various neurological complaints. This condition may be an exaggerated form of the old-fashioned nostalgia.

Tropical eosinophilia is a pseudotuberculosis associated with a blood picture in which the percentage of eosinophil leukocytes may reach 92%. It has been reported from various costal areas of tropical countries such as India, Ceylon, Malaya, Samoa, Australia, Tanganyika, Nigeria, Egypt. In the Western Hemisphere it has been observed in Cuba, Peru, Porto Rico, Guadeloupe, Curaçao, and Brazil. In the latter country, *Recife, the capital of Pernambuco,* is a typical site of the disease. This town, sometimes called the Brazilian Venice, is a seaport, with ca. 600,000 inhabitants. Its climate is humid and warm all year around. A medical member of the University of Recife gathered 80 cases of the chronic benign disease which is marked by the chief features of asthma (climatic asthma). Attempts to transmit the disease to human volunteers failed, while it was possible to inoculate it into guinea-pigs. The only successful therapy for tropical eosinophilia is the use of organic arsenicals such as carbarsone, stovarsol.

One of the great problems of *malaria extermination* in the State of *Santa Catarina,* of Brazil, is the fact that the mosquito carriers, existing in that State, are proliferating in the water caught by the foliage of various Bromelia plants. The larvae of the mosquitoes *Anopheles* (Kerteszia) *cruzii* and *A. bellator* find an excellent cultural bed on these plants, and are ready to act as carriers of malaria, in this state sometimes referred to as *bromelia malaria.*

An interesting study had been carried out *in Victoria,* Australia, on *the epidemiology of schizophrenia.* Statistical studies showed that some environmental influence is adversely acting upon constitutionally predisposed individuals to produce schizophrenia. The survey of Victorian country towns indicated that schizophrenia had the lowest incidence in those towns which had an *abundance of fruit trees,* particularly with stony fruits (peaches, apricots, plums, cherries, almonds, walnuts) in the home gardens. It was also strange to see that citrus-growing towns had a high rate of schizophrenia. One

wonders whether stone fruits or some of their trace-elements may have a protective value against the development of mental disease.

Radio is only a *poor substitute for real human relations,* as a lecturer pointed out at the latest meeting of the European *League for Mental Hygiene.* The radio listeners feel that they are personally addressed by the voice of a living fellow creature. Modern civilization largely cut off the natural contact between men, and this created a certain universal fear of loneliness. The *World Federation of Mental Hygiene* was addressed in a similar sense by the president of the German Federal Health Office who described the latest changes in the German way of life. Under the effect of the post-war years' happenings, a new special conscience was developing. It was realized that only in a society would a human being fully develop. It became also evident that no human being should be wholly possessed by anything or anybody, neither by the family, nor the church, nor a political party. People should preserve their individual freedom and integrity . . . *Multa paucis!*

MASS CASUALTIES—PRINCIPLES INVOLVED IN TREATMENT

The 190 page reprint of the text material which appeared in the April 1956 issue of MILITARY MEDICINE is still available. Single copies $1.50—special price for more than ten copies. Buckram—$3.00 per copy.

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It is a privilege to list the firms who have joined The Association of Military Surgeons as Sustaining Members. We gratefully acknowledge their support.

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ASSOCIATION NOTES

Timely items of general interest are accepted for these columns. Deadline is 3rd of month preceding month of issue.

Department of Defense

Ass't Secretary (Health & Medical)—HON. FRANK B. BERRY, M.D.

Deputy Ass't Sec'y—HON. EDW. H. CUSHING, M.D.

ARMED FORCES STRENGTH

The strength of the Armed Forces on October 31, 1956 was 2,797,230: Army—1,004,056; Navy—677,694; Marine Corps—202,480; Air Force—915,000.

MEDICAL EQUIPMENT

The development of medical equipment and supplies for the Armed Forces has become the responsibility of the Surgeon General of the Army according to a recent announcement by the Department of Defense.

The Medical Equipment Development Laboratory at Fort Totten, New York, will receive approved projects from the Armed Services Medical Materiel Standardization Committee and then make recommendations to the Committee. This laboratory has been a joint operation since 1946, and during its operation many improvements in equipment have been made.

POSTGRADUATE COURSES

Captain William M. Silliphant, MC, USN, Director of the Armed Forces Institute of Pathology, Washington, D.C., has announced two postgraduate courses in specialized pathology: "Pathology of the Oral Lesions," March 18-22; and "Ophthalmic Pathology," March 25-29.

Army

Surgeon General—MAJ. GEN. SILAS B. HAYS

Deputy Surg. Gen.—MAJ. GEN. JAMES P. COONEY

NEW PERSONNEL CHIEF SGO

Col. Floyd L. Wergeland, MC, has been named as the new Chief of the Personnel Division, Office of the Surgeon General. He succeeds Col. Joseph H. McNinch who has been ordered to the Far East.

Colonel Wergeland comes to his new assignment from the Command and General Staff School, Fort Leavenworth, Kansas. He served on two former assignments in the Office of the Surgeon General. In 1944-46 he was Director of Training Division and in 1949-53 he was Chief, Education and Training Division.

He was born at Kirbey, Montana, and in 1931 graduated from the College of Medical Evangelists. He is a graduate of the Infantry School, Fort Benning, Ga., the Command and General Staff School and the National War College.

GENERAL PRACTICE RESIDENCY

The two-year Residency Program in General Practice at the U. S. Army Hospital, Fort Knox, Ky., has been approved by the Council on Medical Education, American Medical Association.

This is the only residency program of general practice conducted by the Army Medical Service and has sixteen participants. The first year of the program is devoted to medicine and medical sub-specialties, including six months in pediatrics; the second year, to surgery and surgical sub-specialties, including six months in gynecology and obstetrics.

GEN. STANDLEE DECORATED

U. S. Army Photo

Mr. Syngman Rhee (left); Maj. Gen. Earle Standlee (right).

Maj. General Earle Standlee, Chief Surgeon AFFE/8th Army (Rear), was awarded the Republic of Korea's highest military decoration on December 5, 1956, for his immeasurable assistance to the Republic of Korea's Army Medical Service.

In an official ceremony President Syngman Rhee personally pinned the Order of Military Merit Taeguk on General Standlee. President Rhee praised General Standlee for his help in training Korean doctors, and for obtaining medical supplies for the Army and civilian hospitals of Korea.

GEN. GLATTLY RETIRED

Brig. Gen. Harold W. Glattly, Surgeon, First Army, retired on January 31 after more than 30 years' Army service. Prior to his retirement he was awarded the First Army Certificate of Achievement. The presentation was made by Maj. General Robert H. Booth, Chief of Staff of the First Army.

General Glattly is a native of Minnesota. He received his medical degree from the Iowa State University in 1926 and entered the military service in August of that year. He has held many important assignments in the Army, one of which was Chief of the Personnel Division, Office of the Surgeon General.

He served twice in the Philippines and during World War II was captured by the Japanese and held in prison camps for more than three years.

On February 1 General Glattly became Executive Director of Prosthetics, Research Board, National Academy of Sciences, National Research Council, in Washington, D.C.

U. S. Army Photo

Maj. Gen. Robt. H. Booth (left) presents Certificates of Achievement to Brig. Gen. Harold W. Glattly (right).

HEAD DENTAL SERVICE BAMC

Brig. Gen. Dale B. Ridgely, former Chief of the Dental Service at Letterman Army Hospital, has been assigned as Director of Dental Activities at Brooke Army Medical Center according to a recent announcement by Maj. Gen. William E. Shambora, Commander of the Center.

INSTRUCTOR AMSS

Lt. Colonel Thurmond D. Boaz, Jr., former associate director of the Division of Local Health Services in the Louisiana State Department of Health, Monroe, La., has joined the faculty of the Army Medical Service School as an instructor in preventive medicine.

SKINNER AWARD

The Skinner Award for the best scholastic rating of any medical officer attending a basic

U. S. Army Photo

Capt. Gilbert D. Huebner (left) receives Skinner Award from Brig. Gen. Elbert Decoursey (right).

course for career officers at the Army Medical Service School, Brooke Army Medical Center, Fort Sam Houston, Texas, was presented recently to Captain Gilbert D. Huebner of South Orange, New Jersey. The presentation was made by Brig. General Elbert Decoursey, Commandant of the School.

Captain Huebner was assigned to Letterman Army Hospital for residency training.

INTERPRETER

U. S. Army Photo

Above we see Lt. Colonel Chao Hwan-ting, senior interpreter from the Nationalist Chinese Army, checking his translation of an American Army text against a previously prepared Chinese training manual to unify certain professional terms. With five other interpreters he is assisting in teaching advanced military medical procedures to 25 top-level non-English speaking Chinese Medical Service officers who are at the Army Medical Service School, Brooke Army Medical Center, Fort Sam Houston, Texas, for a 15-week advanced course of instruction.

VISITORS BAMC

U. S. Army Photo

Miss Hazel Colombe, Lt. Col. Moh Pati Wonojudo, Lt. Col. D. Ashari.

Two ophthalmologists of the Indonesian Army recently visited the Brooke Army Medical Center where they were shown the method of making plastic eyes. Plastic eyes were developed during World War II to overcome some of the many difficulties found in fitting military personnel with artificial eyes.

PREVENTIVE MEDICINE GRADUATE WINS CERTIFICATION

Lt. Colonel Herschel E. Griffin, MC, is the first graduate of the military preventive medicine course at Walter Reed Army Institute of Research to become board-certified in that specialty.

The preventive medicine course was established in the fall of 1953 to give the Army's preventive medicine officers the usual preventive medicine course plus special instruction on military medicine. Twenty-five students have completed the course.

ORTHOPEDIC SURGERY

Orthopedic Surgery in the European Theater of Operations is the title of a recent book in the series of the history of the Army Medical Service during World War II. The book was written by two former orthopedists of the Army Medical Corps, Dr. Mather Cleveland, now of New York City, and Dr. Marshall Urist, now of the University of California. The Editor-in-Chief of the series is Col. John B. Coates, Jr., Office of the Surgeon General.

This book may be obtained from the Superintendent of Documents, Government Printing Office, Washington 25, D.C. The price is $4.00.

TO STUDY NURSE FIELD UNIFORM

Major Estelle M. Traverse, ANC, has been assigned to temporary duty in the Office of the Surgeon General for the purpose of assisting in the study of the field clothing for Army nurses.

She has had considerable military experience under field conditions, assignments including Iceland, the Pacific Theater of Operations and Korea.

REORGANIZATION OF DIVISIONS

The Department of the Army has recommended that the present division organization be changed. The plan calls for a reduction in strength in the Infantry Division by 3,700 men; in the Airborne Division by about 5,600 men; but little change in the Armored Division.

These divisions will be "Pentomic" in character, in other words pentagonal in structure. They will be geared to the anticipated requirements of combat in which atomic weapons may be used.

The changes are designed to raise the combat effectiveness of the Army. When the plans are approved there will be a gradual transition to the new organization.

IONIZING RADIATION CENTER

A former announcement in this journal mentioned the plan to develop a center where experiments could be conducted in the preservation of foodstuffs by ionizing radiation. The Center has now been authorized at the Sharpe General Depot, Lathrop, California and will be known as the U. S. Army Ionizing Radiation Center.

The primary objective of the Center will be to determine the technical and economic feasibility of using ionization radiation for the preservation of foodstuffs in large volume production in sprout inhibition, sterilization, pasteurization, and other forms of food processing. In addition, irradiation services will be provided, as time permits, for studies on other products such as textiles, plastics, leather goods and organic and inorganic chemicals. The plant will have the capacity of sterilizing approximately 1,000 tons of food per month.

MULES AND PIGEONS

The Army pack mules stationed at Fort Carson, Colorado, and the pigeons at Fort Monmouth, New Jersey, are being disposed of in this age of the helicopter and the radio. These two animals have been used in the Army for many years but the machine age has finally caught up with them.

Air Force

Surgeon General—MAJ. GEN. DAN C. OGLE
Deputy Surg. Gen.—MAJ. GEN. W. H. POWELL, JR.

U. S. Air Force Photo

(L to R) Nurse Leva Mister; Airman Koonin; Mrs. Koonin holding Susan Benita, 7 lbs. 14 oz.; and Maj. Gen. Albert W. Kenner, USA, Ret., Medical Director of the hospital.

The First Baby born under the new Dependent's Medical Care Program, authorized by Public Law 569 of the 84th Congress, was the daughter of A/2C Marshall Koonin and Mrs. Koonin, delivered in Columbia Medical Hospital for Women, Washington, D.C.

Navy

Surgeon General—REAR ADM. BARTHOLOMEW W. HOGAN

Deputy Surgeon General—REAR ADMIRAL BRUCE E. BRADLEY

MEDICAL-DENTAL SYMPOSIUM

The U. S. Naval Hospital, Chelsea, Mass., and civilian institutions in Boston, will participate in the Fifth Annual Military Medico-Dental Symposium to be held under the auspices of the Commandant, First Naval District, March 20-22.

Among the prominent guests and speakers on the opening day are the Honorable Frank Berry, Assistant Secretary of Defense for Health and Medicine; Rear Admiral Bartholomew W. Hogan, Surgeon General of the Navy; Maj. General Silas B. Hays, Surgeon General of the Army; Doctor Howard Root, President, Massachusetts Medical Society; Captain Shields Warren, MC, USNR, Professor of Pathology, Harvard Medical School; Dr. Chester S. Keefer, Director, Boston University School of Medicine; and Agnes Ohlson, R.N., President, American Nurses' Association.

Capt. R. Cannon Eley, MC, USNR, Chief of Isolation Service, Children's Hospital, Assistant Clinical Professor of Pediatrics, Harvard Medical School, will serve as general chairman of the Symposium.

Credit points for retirement will be granted to Reserve Officers. Additional information may be obtained by addressing the District Medical Officer, First Naval District, 495 Summer St., Boston 10, Mass.

PREVENTIVE MEDICINE GRADUATES

The Fifth class in Preventive Medicine, conducted for Navy and Air Force Medical Officers graduated recently at the National Naval Medical Center, Bethesda, Maryland.

Graduates of the class were: *Navy*—Lt. James P. Nolan, MC, USNR; *Air Force*—Colonels Charles H. Bramlitt, MC; Charles E. Englehart, MC; James H. Hammon, MC; Claud M. Mears, MC; Philip P. Tease, MC; Mathias F. Regner, MC; Lt. Colonels William O. Bellnaski, Jr., MC; Charles W. DeBaum, MC; Donald M. Kennett, MC; William C. Marett, MC; Oliver A. Mays, MC; Philip B. Watkins, MC, Geoffrey P. Wiederman, MC; and Majors George E. Schafer, MC, and Robert B. Stonehill.

The last class of the series started in January under Captain Julius Amberson, MC, USN, as Director. Classes have been of 18 weeks' duration.

HEADS HISTORY BRANCH

LCdr William R. C. Whalen, MSC, was recently appointed as Head of the Medical History Branch of the Publications Division, Bureau of Medicine and Surgery. He came to this assignment from the U. S. Naval Station, San Diego, California.

FOOD SERVICE

Cdr Leslie E. Bond, MSC, has been appointed Head of the Food Service Section of the Comptroller Division. He relieved LCdr Frank B. Sontag, MSC, who was transferred to the National Naval Medical Center, Bethesda, Maryland, for duty as Food Service Division Officer.

AWARDED CARDIOLOGY FELLOWSHIP

Captain Melville M. Driskell, MC, was recently awarded a fellowship in the American College of Cardiology. He is a Diplomate of the Board of Internal Medicine, and Associate of the American College of Physicians, a member of the American Medical Association and the American Heart Association.

Doctor Driskell is on duty at the U. S. Naval Hospital, Newport, R.I., as Chief of Medicine.

CAPTAIN RAINES HONORED

At the annual meeting of the American Board of Psychiatry and Neurology held last

December, Captain George N. Raines, MC, USN, was elected president. He is the first military medical officer on active duty to be so honored.

Captain Raines is on duty as Head of the Neuropsychiatry Branch of the Bureau of Medicine and Surgery, Department of the Navy.

Public Health Service

Surgeon General—LEROY E. BURNEY, M.D.
Deputy Surg. Gen.—W. PALMER DEARING, M.D.

POLIOMYELITIS

The 52-week period ending December 29, 1956 showed a total of 15,400 cases of poliomyelitis for that period. In 1955 there were 29,270 cases recorded for a like period. Of the 15,400 cases 6,708 were classified as paralytic, and of the 29,270 in 1955 there were 10,641 cases.

BIRTHS AND DEATHS

During 1956 more than 4 million babies were born in the United States. This is an all-time high.

The death rate for 1955 was practically the same as it had been for the 8th successive year—9.3 per 1000 people; little change in the figure was to be expected for 1956 when all data is recorded for that year.

BETTER HEALTH FOR INDIANS

A recent survey by the Public Health Service indicates that the average age at time of death for Indians is 39, compared with 62 for the general population. Out of every 1,000 births, 65 Indian infants die in the first year of life, compared with 27 in the general population. The Indian death rate from diarrhea diseases, is eleven times higher among Indians than for the country as a whole. Indian death rates from tuberculosis are five times higher, from pneumonia and influenza three times higher, and from accidents two and one-half times higher than for the general population.

Plans will be presented for the training of greater numbers of Indians as practical nurses, sanitarian aides, and dental assistants, and for the training of professional staffs in the special problems of Indian health, according to Mr. Folsom, Secretary of the Department of Health, Education, and Welfare.

INEXPENSIVE SEWAGE TREATMENT

The Public Health Service is pushing research into inexpensive sewage treatment methods for smaller cities. One method is the stabilization lagoon of which there are a number now in existence in North and South Dakota. Costs are said to be cut by two-thirds the costs of conventional plants providing the same degree of treatment.

The stabilization lagoon is a shallow, outdoor collection pond where the sewage undergoes treatment by natural, biochemical action, largely through photosynthesis and the action of algae. It provides the same basic treatment as a typical municipal plant.

Veterans Administration

Chief Medical Director—WILLIAM S. MIDDLETON, M.D.
Deputy Chief Med. Dir.—R. A. WOLFORD, M.D.

RESIDENCY IN PSYCHIATRY

The Veterans Administration Hospital, Lyons, New Jersey, has available residencies in Psychiatry for a one to three year period which are fully accredited by the American Board of Psychiatry and Neurology.

The training program consists of lectures, conferences and seminars under the direction of the Department of Psychiatry, New York Medical College, and offers intensive training, both intramurally and through rotation in special hospitals and clinics in the adjacent area.

Training may commence at any time. Address: Director, Professional Education at the above hospital.

MENTAL ILLNESS RESEARCH

Are there chemicals in the body that play

a role in the production of some forms of mental illness? That is the question which the Veterans Administration will attempt to answer by a research program now under way at the VA hospital, Leech Farm Road, Pittsburgh, Pa.

The Director of the program is Dr. Amedeo S. Marrazzi who said his group will study disturbances in brain function which could result from a disorder in metabolism.

SPECIAL MEDICAL ADVISORY GROUP

Two outstanding physicians and a national authority on social work have accepted appointment to the Veterans Administration Special Medical Advisory Group as replacements for three former members.

The new members are: Dr. Harold G. Scheie, professor of ophthalmology at the University of Pennsylvania; Dr. Harold A. Sofield, Chief of the Department of Orthopedic Surgery, West Suburban Hospital, Oak Park, Ill.; and Miss Mary L. Hemmy, professor of social case work at the University of Pittsburgh.

ASSIGNMENTS

Dr. Lloyd B. Andrew has been appointed manager of the Veterans Hospital at Fayetteville, Ark., to fill the vacancy created by the death of Dr. Hursel C. Manaugh in November 1956.

Dr. Thomas L. Harvey, who has been director of professional services at the Veterans Administration hospital in Lake City, Fla. has been appointed as manager of the Birmingham hospital.

Dr. John S. Herring, has been appointed to the position of manager at the Birmingham Veterans Administration Hospital.

Dr. Albert T. Hume has been appointed as manager of the Veterans Administration hospital at Outwood, Ky. He was formerly at the VA hospital in Temple, Texas.

Dr. Leon Ross, has been appointed manager of the Veterans hospital at Brecksville, Ohio. He succeeds Dr. Willard L. Quennell who has been transferred to the VA regional office at Detroit, Michigan.

Dr. Otis N. Shelton has been appointed as manager of the Veterans Administration hospital at Kerrville, Texas. This position has been vacant since the death in September of Dr. Judd H. Kirkham.

Miscellaneous

APPOINTED SPECIAL ASSISTANT

Dr. Aims C. McGuinness was appointed Special Assistant for Health and Medical Affairs to the Secretary of Health, Education, and Welfare. He succeeds Dr. Lowell T. Coggeshall, who has returned to his position as Dean of the Division of Biological Sciences at the University of Chicago.

MORE TRAINING FACILITIES

Augmentation of the facilities for training at medical, dental and public health schools is a project that will receive some attention from the Department of Health, Education, and Welfare this year.

The 85th Congress will be asked to provide funds for this purpose. The 84th Congress enacted a three-year $90 million program of grants for research facilities but made no provisions for classrooms and other teaching facilities. This need is acute according to Marion B. Folsom, Secretary of Health, Education, and Welfare.

POLIOMYELITIS

The National Foundation for Infantile Paralysis has reported that over 15,000 persons were stricken with the disease during 1956. This was a 45 per cent decrease from the 1955 total and a 58 per cent decline from the 1951-55 average. This was the lowest number of cases recorded since 1947.

Paralytic polio struck far more often against the unvaccinated than those who had received one or more shots.

Concern is felt for the older age groups who have not been vaccinated. The group particularly mentioned was that between 20 and 35 years. *Emphasis should be directed toward this group for early vaccination before the summer months are upon us.*

PRIZES FOR GENERAL PRACTITIONERS

Prizes to total 500 pounds in value and to be known as the "Benger Prizes for Original Observations in General Practice" will be awarded by the Benger Laboratories, a British pharmaceutical firm. Entries will be judged by the awards committee of the British College of General Practitioners, and family physicians of any country are eligible.

Mr. Thornley, managing director, said, "the ideas or hunches which we are looking for may be concerned with the causation, diagnosis, treatment or prevention of any disease."

Entries may be in any form and of any length, and should be addressed to Benger Laboratories, Lts., Holmes Chapel, Cheshire, England.

SOCIAL SECURITY

Payments are now being made at the rate of $485 million a month to 9.2 million people. Benefit payments for 1956 totalled $5.7 billion with administrative expenses of $133 million.

INTERNATIONAL COLLEGE OF SURGEONS MEETING

February 24-28 are the dates for the Tenth International Congress of the International College of Surgeons. The meeting will be held in Mexico City.

CINCINNATI ACADEMY OF MEDICINE

The Academy of Medicine of Cincinnati invites all physicians, their families, and their patients to its 100th Birthday Party, February 27 through March 5. A Health Museum and Exposition will be established in Cincinnati's Music Hall. There will be 175 health and scientific exhibits.

ORTHOPSYCHIATRIC ASSOCIATION MEETING

The 34th annual meeting of the American Orthopsychiatric Association will be held at Hotel Sherman, Chicago, March 7-9. The address of the association is: 1790 Broadway, New York 19, N.Y.

INTER-AMERICAN MEDICAL CONVENTION

Eminent speakers have been obtained for the Second Inter-American Medical Convention to be held in Panama City, April 3, 4 and 5.

Convention Headquarters will be at Hotel El Panama, and the scientific program will be held in the auditorium of the University of Panama which is within walking distance.

VD POSTGRADUATE CONFERENCE

The 26th Venereal Disease Postgraduate Conference for physicians sponsored by the University of Tennessee College of Medicine and the Public Health Service will be held at the College of Medicine in Memphis, April 18-20, 1957. There will be no tuition.

Applications for admission should be sent to Dr. Henry Packer, Department of Preventive Medicine, University of Tennessee, College of Medicine, Memphis 3, Tenn.

MEETING

The American Association of Medical Record Librarians will hold an annual meeting at the Schroeder Hotel, Milwaukee, Wis., October 7-10, 1957. The Executive Office of this association is at 510 North Dearborn St., Chicago 10, Ill.

MEETING

The American Public Health Association has announced the following dates for their 85th and 86th annual meetings: November 11-15, 1957, Cleveland, Ohio; October 27-31, 1958, St. Louis, Mo.

The address of the Association is 1790 Broadway, New York 19.

CANCER CONGRESS

The Seventh International Cancer Congress will be held in London, England, July 6-12, 1958. Special emphasis will be placed on Hormones and Cancer, Chemotherapy, Carcinogenesis and Cancer of the Lung.

Papers for this Congress will be considered if submitted with an accompanying abstract (not over 200 words) before October 1957 and if dealing with new and unpublished work.

Further information may be obtained from: The Secretary General, Seventh International Cancer Congress, 45 Lincoln's Inn Fields, London, W. C. 2, England.

NURSING AND FIRST AID GUIDE FREE

Home Health Emergencies is a 256-page illustrated pocket-size book of home nursing and first aid, available at no cost on individual request from the Equitable Life Assurance Society of the United States. Address the Bureau of Public Health, that society, 393 Seventh Ave., New York 1, N.Y.

INSURANCE AND BENEFITS

Principles of Insurance and Government Benefits for Service Personnel is in its 6th Edition. This outstanding book has been written by Capt. James M. Garrett, III, and Associates in Social Sciences, United States Military Academy.

This 213-page book contains authoritative information and should be in the hands of all those who are really planning for their future security and that of their families.

Copies may be obtained from The Military Service Publishing Company, Harrisburg, Pa., for $2.00 per copy.

SOMETHING NEW

A light weight emergency oxygen apparatus which will give up to 25 minutes of oxygen and will fit into a case no larger than a brief case is now available for cardiacs, asthmatics, doctors and industrial clinics.

A cyclic traction apparatus for treatment of pelvic and cervical cases is now available. A sense of security is provided in that there is a patient controlled switch which also permits the traction to be stopped at a desired force.

A new head halter for cervical traction gives the lift under the jaw instead of from the cheek bone.

BLOOD TYPE

"Extract from a letter from one teen-ager to another, reported to us by a puzzled parent: 'My mother gets very mad every time anybody tries to get her to do anything that she doesn't want to do. Daddy says she can't help this because it is on account of her blood type which is Irish Negative.'"—*Montrealer.*

ACCIDENT TOLL

The total loss from individual injuries in 1955 is estimated at 193 million man-days—enough to produce 100 million refrigerators, 200 million men's suits, 1.5 billion pairs of men's shoes, 26,000 jet bombers, 1 million 6-room homes, or 2 billion tons of coal.—*Labor Law Journal.*

INCOME

American incomes (after taxes) have increased from 93 billion dollars in 1941 to 284.9 billion in 1956. However, their debts for home mortgages, installment purchases, and other things have climbed from 55.6 billion dollars to 199.5 billion dollars during the same period.—*Survey Bulletin.*

PILLS

During the academic year 1955-56 a total of 1,573 women were studying medicine in the 76 approved four-year medical schools in the United States. This may account for the influx of different colored pills.—*The Kablegram.*

ANNUAL BUSINESS MEETING

Report on annual meeting of the Association of Military Surgeons of the United States, held November 14, 1956, in the Presidential Ballroom of the Hotel Statler, Washington, D. C., the President, Rear Adm. W. Dana, presiding.

The first order of business was the report of the Secretary (Colonel Robert E. Bitner, USA, Ret.) which follows:

This past fiscal year which ended September 30, 1956 was a successful one when considered from a financial standpoint. I am happy to report that the Association is in a financially sound position. The auditor's detailed report is too lengthy to read at this time but is on file for those interested. How-

ever, highlights or rather a summary follows:

GENERAL FUND

Assets

Cash in bank	$12,751.87
Petty cash fund	20.00
Accounts receivable	6,114.84
Investments (Govt. Bonds & PRR Common Stock)	48,328.00
Office furniture and equipment	4,623.30
Total	$71,838.01

Liabilities

Withheld Income Tax payable	$ 281.60
Social Security Tax payable	8.58
Total	$ 290.18

SUSTAINING MEMBERSHIP FUND

On deposit	$14,468.85
General Fund Assets plus Sustaining Membership	$86,306.86
Less liabilities	290.18
Net worth (Sept. 30/56)	$86,016.68

TRUST FUND

There is entrusted to the Association Government Bonds in the amount of $7,600, a portion of the interest from which is used for the Major Louis Livingston Seaman Prize, the balance deposited in a savings account. The total value of this fund is $8,216.54, an amount which is not and should not be considered in the net worth of the Association.

For convenience the Convention Fund of the Association is kept as a separate account. All financial transactions relating to the Conventions are handled in this account. On September 30, 1956 the account showed a deficit of $606.54.

A few remarks should be made about the Sustaining Membership Section. As stated this program accounted for $14,468.85 of the total of $86,016.68 net worth of the Association. During the year there was a loss of five members with one gain, leaving a total membership of 33 on September 30, 1956. There has been much activity in this section. General McCallam who has headed the section has been in close contact with the members and has been extremely helpful to them in obtaining information for individual members and for the membership as a whole. Much good has resulted and relations with the industries represented have been strengthened. This has not been a *take* program by any means; there has been a lot of *give*.

So much for financial matters. I should like to make some remarks about our official publication, *Military Medicine*. The April 1956 issue contained all the papers given at the 1955 Convention. Reprints were made of these papers and bound with a special cover —titled "Mass Casualties—Their Management and Treatment." This has proven to be an extremely valuable collection. Over 20,000 copies of the April issue and collected reprints have been distributed.

The expenses of publishing the journal have increased. There has been a rise in the cost of paper and a rise in labor costs. This will means an additional expense to the Association of approximately $3,500 for the year.

The journal has been sent free to the libraries of all medical, dental, veterinary, and Class "A" pharmacy schools. The Association has thus in a small way contributed its part to education. The practice started will continue next year (1957) and it is hoped that that practice can continue indefinitely. That depends, of course, on the financial condition of the Association.

One of the disappointing facets is the memberships. While the losses have not been great the curve should be up and not down. I suggest that members talk up the Association. If every member got just one new member during the next year the curve could be changed. I regard membership in the Association as one of the great needs. Our Association must be known by the younger persons as well as by the older. How to get the Association known better should be a main objective for several years to come.

Our Group Insurance Program has provided many members with a fine policy at

low cost. Just recently two more plans have been approved by the Executive Council—the Accidental Death and Dismemberment and the Major Medical Expense plans.

Finally the very successful conventions we have had for the past five years should be mentioned. All who have had a part in these, and the list is very long, have worked hard to make them successful, and they have been successful.

I close my report on that note and with the announcement that the 64th Annual Convention will be held in this hotel on October 28, 29, and 30, 1957.

The proposed amendment to the Constitution of the Association which was printed in the July, September, and November, 1956 issues of MILITARY MEDICINE was defeated.

The Nominating Committee proposed the following names for officers for 1957:

President: Col. Amos R. Koontz, MC, NG, Md.

1st. Vice-President: Col. Charles R. Mueller, USA, Ret. (VA)

2nd. Vice-President: Brig. Gen. H. H. Twitchell, USAF (MC)

3rd. Vice-President: Maj. Gen. Wallace H. Graham, USAFR (MC)

4th. Vice-President: Asst. Surg. Gen. John W. Cronin, USPHS

5th. Vice-President: Maj. Gen. James P. Cooney, MC, USA

6th. Vice-President: Rear Adm. Irwin L. Norman (MC), USN

Motion was made to accept this panel and the officers were duly elected.

Report of the Retirement Fund Board of Trustees was presented by its Chairman, Brig. Gen. L. C. Fairbank, USA, Ret. This report was accepted by the Association.

The gavel was turned over to the new President, Col. Amos R. Koontz, MC, NG, Md. who asked for any further business to be brought before the Association. There being none, the meeting adjourned at 12 o'clock noon.

INFORMATION FOR AUTHORS

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ADDRESS: Send manuscripts to the Editor, MILITARY MEDICINE, Suite 718, 1726 Eye Street, N.W., Washington 6, D.C.

40 FORTY YEAR CLUB 40

THE following have been members of the Association of Military Surgeons of the United States for forty or more years, and under the Constitution of the Association have been made Life Members. We recognize their loyal support to the Association, and wish them years of health and happiness:

Rudolph Matas, M.D.
New Orleans, La.
Member since 1896

Ash, James E., Col., U. S. Army, Ret.
Ball, T. Z., Major Med. Res., U. S. Army
Bethea, James A., Major Gen. U. S. Army, Ret.
Boland, Micajah, Capt., MC, U. S. Navy, Ret.
Boone, Joel T., Vice Adm., MC, U. S. Navy, Ret.
Brenn, Charles E., Col., U. S. Army, Ret.
Bundeson, Herman N., M.D.
Butler, Ethan Flagg, Lt. Col. Med. Res. U. S. Army
Callender, George B., Brig. Gen. U. S. Army, Ret.
Carroll, Frank M., Lt. Col., Med. Res. U. S. Army
Comfort, Charles W., Jr., Col. MC, Conn. NG
Dearborn, Frederick M., Col. Med. Res., U. S. Army
Decker, William N., Major Mass. NG, Ret.
Dorsey, Benjamin H., Rear Adm. MC, U. S. Navy, Ret.
Duval, Douglas F., Col. U. S. Army, Ret.
Eckert, M. Milton, Capt. Med. Res., U. S. Army
Ferenbaugh, Thomas L., Col. U. S. Army, Ret.
Fife, James D., Col., U. S. Army, Ret.
Freeman, Paul L., Col. U. S. Army, Ret.
Goodrich, Harold A., Capt. Med. Res., U. S. Army
Gray, Charles J., Lt. Col. Dent. Res., U. S. Army
Gundlach, Arthur, Capt. Med. Res., U. S. Army
Hart, W. Lee, Brig. Gen. U. S. Army, Ret.
Harwood, Thomas E., Jr., Col. U. S. Army, Ret.
Heflebower, Roy C., Brig. Gen. U. S. Army, Ret.
Henry, Reginald B., Capt. U. S. Army, Ret.
Hooper, Lionel E., Med. Dir. U.S.P.H.S.
Hurley, J. Raymond, Surg. U.S.P.H.S.
Kerr, John W., Med. Dir., U.S.P.H.S., Ret.
Krafft, Henry L., U. S. Army, Ret.
Kremers, Edward D., Col. U. S. Army, Ret.,
Leake, James P., Med. Dir. U.S.P.H.S., Ret.
Love, Albert G., Brig. Gen. U. S. Army, Ret.
Lull, George F., Maj. Gen., U. S. Army, Ret.
McConnell, William J., Col. M.C., A.U.S.
McDonald, Robert C., Brig. Gen. U. S. Army, Ret.
Merchant, Marcius H., Col. R.I. NG
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COMPETITION FOR 1957

THE competition is open to all medical department officers, former such officers, of the Army, Navy, Air Force, Public Health Service, Veterans Administration, The National Guard and the Reserves of the United States, commissioned officers of foreign military services, and all members of the Association, except that no person shall be eligible for a second award of this medal and prize and no paper previously published will be accepted.

The award for 1957, a medal, a scroll, and a cash prize of $500, will be given for the paper selected by a committee composed of the Association's vice-presidents which reports on the most useful original investigation in the field of military medicine. The widest latitude is given this competition, so that it may be open to all components of the membership of the Association. Appropriate subjects may be found in the theory and practice of medicine, dentistry, veterinary medicine, nursing and sanitation. The material presented may be the result of laboratory work or of field experience. Certain weight will be given to the amount and quality of the original work involved, but relative value to military medicine as a whole will be the determining factor.

Each competitor must furnish six copies of his paper which must not be signed with the true name of the author, but are to be identified by a ***nom de plume*** or distinctive device. These must be forwarded to the Secretary of the Association of Military Surgeons of the United States, Suite 718, 1726 Eye St. N.W., Washington 6, D.C., so as to arrive at a date not later than 1 July 1957, and must be accompanied by a sealed envelope marked on the outside with the fictitious name or device assumed by the writer and enclosing his true name, title and address. The length of the essays is fixed between a maximum of 10,000 words and a minimum of 3000 words. After the winning paper has been selected the envelope accompanying the winning essay or report will be opened by the Secretary of the Association and the name of the successful contestant announced by him. The winning essay or report becomes the property of the Association, and will be published in MILITARY MEDICINE. Should the Board of Award see fit to designate any paper for "first honorable mention" the Executive Council may award the writer life membership in The Association of Military Surgeons, and his essay will then also become the property of the Association.

BOOK REVIEWS

PEACEFUL USES OF ATOMIC ENERGY. Proceedings of the International Conference in Geneva, August 1955. Vol. 11. Biological Effects of Radiation. 402 pages. Columbia University Press, New York. 1956. Price $8.00.

This subject has become one of great popular concern as is well attested by the abundance of news articles and publicized interviews, many of them disturbing and alarming. The subject is of course one of grave professional importance to all practitioners of the healing arts and sciences as well as to the handful, relatively speaking, of radiation specialists. The implications of radiobiology involve workaday practice as well as meeting the problems of nuclear weapons. Thus this volume is most timely and, since its articles are authoritative and cover a wide area, one can hope that it will help to spread a well balanced perspective amidst the present confused clamor which one day belittles radiation dangers and the next seems to have all creation headed for early extinction from radiation exposure.

Evil effects on embryonic development are described by L. B. and W. L. Russell of the Oak Ridge laboratories. These are important and call for great care and conservatism in exposures to radiation in pregnancy especially in the early months and, of course, if the pelvis is involved.

Coming now to other matters, there is an ample variety of interesting and valuable material: Instances of acute radiation disease are described by R. J. Hasterlik and L. D. Marinelli of the Argonne facilities and include data on physical dosimetry. K. Guskova and G. D. Baisogolov of the U.S.S.R. give an elaborate account of two accidental cases which occurred in their country. Masao Tsuzuki of Tokyo University contributes remarks on biomedical effects, early and late effects and injury from fall-out. The modes of radiation injury and death are considered in over a dozen papers and include an excellent general commentary from Austin M. Brues of the Argonne Laboratory. Carcinogenesis and the related metabolism of bone-seeking isotopes are presented in about 8 additional papers.

Mechanisms of injury and also protection and recovery factors are amply covered and include an interesting account of partial cell irradiation with microbeams of ionizing radiation by R. E. Zirkle and his co-workers of the University of Chicago. A practical article on medical care of wounds contaminated with radioactive materials is contributed by E. A. Hathaway and A. J. Finkel of the Argonne Laboratory.

This account far from exhausts what the volume has to offer. It is a book worthy of wide circulation and study. It deserves a place in general medical libraries as well as those devoted to radiation.

REAR ADM. CHAS. F. BEHRENS, MC, USN, RET.

THE TRAINING OF SANITARY ENGINEERS. WHO Monograph No. 32 By Mili oj Petrik, Professor at University of Zagreb, Yugoslavia. (French edition in preparation.) 151 pages. Columbia University Press, New York. 1956. Price $4.00.

The sanitary engineer has long been recognized as an essential member of the public health team, along with the medical health officer, the public health nurse, and other specialists.

Sanitary engineering as a profession had its beginnings in the United States some 60 years ago, when the first courses in this important field were offered at the Massachusetts Institute of Technology. Today there are about 5,000 practising sanitary engineers in this country, of whom one-third have had formal training at university level. In Europe, where environmental sanitation generally is a much more serious problem than in the United States, courses in sanitary engineering are now given in institutions in 16 countries, although there is great disparity in the educational standards, and the demand for such personnel far exceeds the supply. This book, by a prominent sanitary engineer in Yugoslavia, is the report of a survey of the curricula in 14 engineering schools and 10 schools of public health in the United States, and in 16 European countries. It was developed in preparation for a symposium on the training of sanitary engineers, sponsored by the World Health Organization at Oxford in 1955. It should be of interest to anyone concerned with this important subject.

COL. JAMES A. TOBEY, USA, RET.

NEW BOOKS

Financing Hospital Care in the United States, three volumes. Blakiston Div., McGraw-Hill Book Co., Inc., New York, N.Y. Price $9.85.

Training for Childbirth, by Herbert Thoms, M.D. Blakiston Div., McGraw-Hill Book Co. Inc., New York, N.Y. Price $4.00.

Understanding Natural Childbirth, by Herbert Thoms, M.D. in collaboration with Laurence G. Roth, M.D. Picture story by David Linton. Blakiston Div., McGraw-Hill Book Co., Inc. New York, N.Y. Price $3.95.

Mental Health Planning for Social Action, by George S. Stevenson, M.D., Sc.D. Blakiston Div., McGraw-Hill Book Co., Inc. New York, N.Y. Price $6.50.

Diseases of the Heart and Circulation, 2nd Edition, by Paul Wood, O.B.E., M.D., J. B. Lippincott Co., Philadelphia, Pa. Price $15.00 (U.S. Market only).

A Source-Book of Medical Terms, by Edmund C. Jaeger. Charles C Thomas, Publisher Springfield, Ill. Price $5.50.

Clinical Orthopaedics, #8, Chronic Hereditary Diseases and Developmental Anomalies. Anthony F. De Palma, Editor-in-Chief. J. B. Lippincott Co., Philadelphia, Pa. Price $7.50.

The Principles and Practice of Medicine, 3rd ed. by Davidson. The Williams & Wilkins Co., Baltimore, Md. Price $8.00.

Alcoholism, by Williams. The Williams & Wilkins Co., Baltimore, Md. Price $3.00.

The Visual Fields, by David O. Harrington, A.B., M.D., F.A.C.S. The C. V. Mosby Co., St. Louis, Mo. Price $16.00.

Epileptic Seizures, edited by John R. Green, M.D. and Harry F. Steelman, M.D. The Williams & Wilkins Co., Baltimore 2, Md. Price $5.00.

Principles of Insurance and Government Benefits for Service Personnel, by Capt. James M. Garrett, III, and Associates in the Social Sciences, U.S.M.A., West Point, N.Y. The Military Service Publishing Co., Harrisburg, Pa. Price $2.00.

History of the American Board of Surgery, 1937-1952, by J. Stewart Rodman, M.D. J. B. Lippincott Co., Philadelphia, Pa. $3.00.

Beyond Laughter, by Martin Grotjahn, M.D., McGraw-Hill Book Co., Inc., New York, N.Y. Price $6.00.

Children's Eye Problems, by Emanuel Krimsky, M.D. Grune & Stratton, Inc., New York, N.Y. Price $6.00.

Dictionary of Poisons, by Ibert Mellan and Eleanor Mellan. Philosophical Library, New York, N.Y. Price $4.75.

Lymphatics, Lymph, and Lymphoid Tissue, by Jos. M. Yoffey and Frederick C. Courtice. Harvard University Press, Cambridge, Mass. Price $10.00.

Practitioners' Conference, Vol. 5, edited by Claude E. Forkner, M.D. Appleton-Century-Crofts, Inc., New York, N.Y. Price $6.75.

Industrial Deafness, by Joseph Sataloff, M.D. McGraw-Hill Book Co., Inc., New York, N.Y. Price $8.00.

Micro-Analysis in Medical Biochemistry, by E. J. King and I. D. P. Wootton. Grune & Stratton, New York, N.Y. Price $4.00.

A. M. A. Scientific Exhibits, 1956. Grune & Stratton, New York, N.Y. Price $10.00.

Analytical Pathology, Edited by Robert C. Mellors, M.D., Ph.D. McGraw-Hill Book Co., New York, N.Y. Price $12.00.

Liver: Structure and Function, by Hans Popper, M.D., Ph.D. and Fenton Schaffner, M.S., M.D. McGraw-Hill Book Co., New York, N.Y. Price $20.00.

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Professional literature available upon request.

1. Figurelli, F.A.: Indust. Med. & Surg. 25:376 (Aug.) 1956.

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